

DOCUMENT RESUME

ED 111 653

SE 019 519

AUTHOR Babikian, Elijah; And Others
TITLE Content Analysis of Heath Mathematics Program for Elementary Grades K-6.
INSTITUTION Southwest Regional Laboratory for Educational Research and Development, Los Alamitos, Calif.
REPORT NO SWRL-TN-3-72-32
PUB DATE 27 Sep 72
NOTE 146p.
EDRS PRICE MF-\$0.76 HC-\$6.97 Plus Postage
DESCRIPTORS *Content Analysis; Curriculum; Elementary Education; *Elementary School Mathematics; Evaluation; Instruction; Learning Activities; *Mathematics Education; *Objectives; *Textbooks
IDENTIFIERS Heath Elementary Mathematics Series; Learning Mastery System; Southwest Regional Laboratory

ABSTRACT

The purpose of the analysis was to provide a profile of instructional activities related to content and referenced to specified instructional outcome areas. Emphasis was placed on determination of four major factors: (1) major outcomes in the program and their relative emphasis in both regular and supplementary instructional materials, (2) the distribution of content within and across instructional units (chapters), (3) points in the instructional sequence where mastery of outcomes is assessed, and (4) the amount of independent practice in regular and supplementary instructional materials related directly to each major outcome developed in the program. The content analysis was organized by 13 content strands and is presented in a series of tables. Table entries indicate the grade level and page location at which each topic is discussed. Locations of diagnostic tests are also indicated. The completed analysis forms the basis for preliminary specification of an application of Learning Mastery System procedures to the series. (Author/SD)

* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *

SE

ED111653



SOUTHWEST REGIONAL LABORATORY TECHNICAL NOTE

DATE: September 27, 1972

NO: TN 3-72-32

TITLE: CONTENT ANALYSIS OF HEATH MATHEMATICS PROGRAM FOR ELEMENTARY GRADES K-6

AUTHORS: Elijah Babikian, Jim Winchester and Aaron Buchanan

ABSTRACT

A content analysis was completed of the D.C. Heath mathematics series for elementary grades. The purpose of the analysis was to provide a profile of instructional activities related to content and referenced to specified instructional outcome areas. Emphasis was placed on determination of:

1. major outcomes in the program and their relative emphasis in both regular and supplementary instructional materials.
2. the distribution of content within and across instructional units (chapters).
3. points in the instructional sequence where mastery of outcomes is assessed.
4. the amount of independent practice in regular and supplementary instructional materials related directly to each major outcome developed in the program.

The completed analysis forms the basis for preliminary specification of an application of Learning Mastery System procedures to the series.

019 519

CONTENT ANALYSIS OF HEATH MATHEMATICS PROGRAM FOR ELEMENTARY GRADES K-6

Elijah Babikian, Jim Winchester and Aaron Buchanan

This document describes a content analysis of the Heath mathematics series for elementary grades. The document is divided into three sections as follows:

Description of the Analysis. Procedures used by staff members of the Southwest Regional Laboratory for Educational Research and Development (SWRL) in performing the analysis are described. These procedures were used to generate descriptors of instructional outcomes from index entries in the Heath teacher's editions and to determine the location of instructional and evaluation activities relevant to these outcomes in various Heath components.

Interpretation of the Analysis. Procedures are recommended for identifying relationships in the analysis table between content organization, evaluation of outcomes, and provisions for individual practice, and for comparing these relationships with those desired in an application of a Learning Mastery System.

Preliminary Specifications of a Learning Mastery System Application. Broad preliminary specifications for the architecture of an application of a Learning Mastery System to the Heath series are presented. These specifications include: (1) a discrete number of broad instructional outcomes that can serve as a unifying structure for assessing pupil progress through various levels of the program, (2) suggested evaluation components, and (3) materials suitable for individual practice on

outcomes assessed in LMS throughout the program.

DESCRIPTION OF THE ANALYSIS

CONTENT STRANDS

The analysis is organized around twelve vertical strands of content identified by Heath as basic units of a program structure. These strands are listed below in the order of their appearance in the program scope and sequence chart in each teacher's edition.

Structure
Sets
Numeration¹
Number¹
Number sentences
Addition and subtraction
Multiplication and division
Geometry
Measurement
Functions¹
Problem solving and applications
Probability and statistics
Number theory

OUTCOME DESCRIPTORS

For each strand and substrand, a set of outcome descriptors has been prepared by SWRL staff to describe the content at each level of the program. These descriptors are statements of expected outcomes of instruction. A set of descriptors from the "Number and Numeration" strand in Level 5 is shown below.

1. Read and write numerals

To thousands
To hundred thousands

¹In levels 5 and 6 "Numeration" and "Number" are combined into one strand, and "Functions" is introduced.

To millions
To billions

2. State the place-value of a digit

In whole numbers
In decimal fractions

3. Represent numerals in different forms

Expanded form
Standard form
Exponential form

4. Recognize fractional numbers in common form

Equivalent fractions
Improper fractions
Mixed numerals

5. Relate fractional numbers in common form to

Whole numbers
Mixed numerals
Fractional numbers in decimal form

Outcome descriptors were derived using the following procedures:

1. All entries in the index of the teacher's edition were partitioned according to content strands listed in the scope and sequence chart. Since scope and sequence entries overlapped somewhat between strands, elementary priorities in classification were followed which eliminated most of the multiple listing of index entries.

2. Within each strand, index entries were translated into a small set of statements of intended mathematical behaviors (outcome descriptors). In some instances, the descriptors are comprehensive, and no subordinate outcomes are included; in other instances, subordinate outcomes are included because major portions of the instructional materials were devoted to their review.

TABLE ENTRIES

Instructional activities (designated lessons) from the core components of the Heath program were classified according to the pre-specified outcome descriptors. Since the purpose of the analysis was to obtain a profile of instructional activities, an exhaustive listing of all activities included in all components was not necessary. The components used were the student text (teacher's edition), the basic worksheets and a separate battery of diagnostic tests. Supplementary worksheets were not included because they do not present the basic concepts and skills in the same setting as the textbook, and they are not intended for remediation. A description of all supplementary program components is in Appendix A.

Entries in the table are page numbers in the student text, workbook, and diagnostic test batteries where instructional activities pertinent to the outcome descriptor are located. For each entry, the number of items or problems directly related to the outcome descriptor was determined. It was reasoned that item frequencies directly related to an outcome descriptor are better indicators of the amount of independent practice provided in a chapter for each outcome than are page entries. In determining item frequencies, the number ten was chosen as a cutoff point since most instructional activities related principally to major outcomes contained at least ten items of practice. An entry of (10) following a set of page entries indicated that ten or more items providing direct practice on the outcome were found in the chapter.

During the course of the analysis, it became necessary to develop conventions for determining item frequencies. Items were counted according to the number of separate responses requiring direct outcome-related performances. In some instances, such as the reproduction of counting sequences, individual responses were not independent of each other. In this case, each separate sequence was counted as a response. In many instances, mastery of a particular outcome, such as recognition of commutativity of addition, would be helpful in making a response, but unnecessary. Where responses could be made as a result of acquisition of some other outcome, especially an outcome that is learned rather early in the instructional sequence (such as recognition of number facts), no items were recorded with the descriptor. Conventions were also developed for classifying problems in activities involving either number line or semi-concrete pictorial models to solve equations. While use of the model might be helpful in making a required response, it was seldom required that the model be interpreted; a recall of basic number facts or the application of some computation algorithm was usually sufficient. In instances such as these, an item was recorded for purposes of the analysis with a descriptor involving "models" if there were separate representations of the model for each equation.

Actual entries for a particular descriptor are coded as follows:

1. Pages from the student text (or student pages from the teacher's edition) appear in regular typeface with the number of items, to 10, following in parentheses.
2. Pages from the student workbook and the number of related

items, to 10, are underlined.

3. Diagnostic test entries are preceded by DT with the number of the test and the number of items related to the descriptor following.

INTERPRETATION OF THE ANALYSIS

CONTENT STRANDS

The distribution of content in the program can be inferred from the analysis in the following ways:

1. Examination of Instruction and Evaluation Entries for a Particular Outcome Across Chapters and Levels. It is possible to draw some conclusions concerning the independence of one outcome from another. If there are several instructional entries, but few review or evaluation entries, it is possible to infer that this outcome cannot be easily separated from other outcomes during instruction. This inference is related to methods used in development of the analysis. The major source of instruction entries (textbook) was the index of teacher's editions at each level. Since index entries are likely to be classified with as many content domains as are possibly relevant, there was some multiple classification among instructional entries. Review and evaluation entries, on the other hand, were made from a page-by-page analysis of the components. In this case, multiple classification was avoided wherever possible, and activities were referenced to the outcome with the most appropriate descriptor.

2. Examination of Entries in the Chapter Columns. For purposes of a Learning Mastery System, it is desirable that content included in

each chapter be reasonably homogeneous. Unit division should be determined primarily by outcomes to be acquired and their presentation sequence. The instructional entries in each chapter should be spread over no more than 7 or 8 outcomes if evaluation of mastery is to retain some reliability and tests are to remain a reasonable length. Where chapters in Heath provide instruction on more outcomes than this, it may be necessary to defer assessment of some outcomes until they are represented in a subsequent chapter.

3. Examination of all Descriptors for a Particular Content Strand over all Levels of the Program. If there are very few descriptors that differ distinctly, or if the set of descriptors show little hierarchical relationship, the strand probably does not possess strong sequential characteristics of its own. Frequently, as in "Problem Solving and Application", the strand exists primarily for the inclusion of activities where mathematical skills are applied to verbal or pictorial problems. Some strands, such as "Sets" in Levels K-3, exist principally as a model for whole numbers and related operations. By comparison, material devoted directly to the development of concepts related to sets and set theory is relatively minor.

OUTCOME ASSESSMENT

Instructional entries frequently occur in the analysis with no accompanying evaluation entries. In general, this circumstance implies one of the following:

1. Evaluation is deficient.
2. Instruction is primarily in the form of teacher explanation

with little or no independent practice for the pupil.

3. Instruction and practice on a particular outcome cannot be separated from a more inclusive outcome.

4. The outcome is minor in comparison to the amount of instruction given on other skills presented in the unit.

The number of items per skill-per unit averages 3-4 for major skills and 1-3 for minor skills. Item frequencies such as these may be adequate in skill maintenance or retention, but should probably be increased in criterion exercises where acquisition of new or extended skills is assessed.

INDEPENDENT PRACTICE

The amount of independent practice on each outcome can be determined by attending to the numbers in parentheses following underlined and non-underlined page entries. Of primary interest are instances where instructional entries (regular instruction and review) are associated with fewer than ten items of independent practice. The number ten was chosen as a reference point for the analysis since many activities approached but did not exceed this number. It was reasoned that outcomes with fewer than ten items of practice, and particularly outcomes with fewer than five or six items, do not provide sufficient practice for attainment of the skill.

PRELIMINARY SPECIFICATIONS OF A LEARNING MASTERY SYSTEM APPLICATION

CONTENT STRANDS

The strands of content related to the arithmetic of whole and

rational numbers are dominant. This may be inferred by inspecting the number of outcomes developed (as represented by outcome descriptors) and the number of instructional entries per outcome. Outcomes developed in these strands, as well as most of their substrands, usually include at least 10 items of independent practice. Strands such as "Number Sentences" and "Number Theory", contain so many outcome descriptors in common with other strands that it is doubtful their preservation as independent outcome areas in a Learning Mastery System would be worthwhile.

INSTRUCTIONAL OUTCOMES

Five or six broad outcomes such as the following likely will be recommended as a basic outcome structure for the development of Learning Mastery System procedures:

1. Recognize basic elements and concepts
2. Decode systems of symbols
3. Express mathematical relationships
4. Verify mathematical relationships
5. Perform operations
6. Solve verbal problems

One or more of these outcomes represent major skills to be developed in each of content domains such as the following:

- I. Sets
- II. Whole numbers
- III. Rational numbers (positive)
- IV. Integers

V. Geometry

VI. Measurement

VII. Logic

Pupil progress through broad instructional sequences for outcomes applicable to each content domain will be monitored throughout the program. At each level, a set of outcome descriptors will further refine cells in the outcome-content matrix to reflect all of the content included in the program for that level.

EVALUATION COMPONENTS

In a number of instances recognition of properties of mathematical operations is introduced through verbal instructions given by the teacher. Pupils are encouraged but not required to recognize these properties in solving related equations or problems. Acquisition of skills such as these should not be assessed in a Learning Mastery System until approximately 10 items of independent practice have been provided in a single chapter.

In chapters where no instruction on new outcomes is begun, the principal outcomes under review will be evaluated. The context for evaluation should include settings which parallel those used during regular instruction, but they should also include some transfer settings which may be generally familiar to the pupil but not in association with the outcome under development. In general, there should not be more than two or three items of the latter type for any particular outcome developed in a chapter.

LMS evaluation components for each level of Heath should include

the following:

1. Four to Six Pretests for Each Level. The number of pretests will be determined by the number of major breaks in the continuity of the instructional sequence. It will not be necessary to develop a pretest for each chapter, since many follow directly from the previous chapter. Essentially, all of the information which might be of value to the teacher can be obtained from posttest or criterion exercise instruments for the previous unit. Pretests should provide a comprehensive sample of behaviors that are prerequisite to the major skills developed in the chapter. The information obtained from the pretest should guide the teacher in determining the relative emphasis to be given any prerequisite behaviors which are reviewed prior to the introduction of new material.

2. En-route Assessment Devices for Each Major Outcome Introduced or Reviewed. A limited number of problems in the regular daily assignment will be identified which the teacher can review as a check on the progress of the pupil toward mastery of the outcome.

3. End-of-Unit Criterion Exercise for Each Unit. Each exercise should include at least one section for each of the major outcomes on which instruction was provided in that unit. Approximately 4-5 items should be included for each individual outcome representing material which has been introduced or extended. One or two items should be included for each descriptor where previously mastered skills have been reviewed or maintained.

Each exercise should include a limited number of problems where

computational skills which have been developed are applied to the solution of verbal problems. The format for all items on the criterion exercise should be multiple choice with at least some of the distractors representing typical errors which might be made on this type of problem.

SWRL-developed instruments are recommended over existing Heath Diagnostic Tests for the following reasons:

- (1) Heath Diagnostic Tests are not clearly organized around instructional outcomes.
- (2) Many outcome areas are evaluated with fewer than 4 items per instrument.
- (3) The constructed response format used with items is incompatible with machine scoring and remedial practice based on typical errors.
- (4) Separate Diagnostic Tests are not available for Levels K-2.

PRACTICE COMPONENTS

Appropriate material should be developed for all levels. They will provide practice exercises in the same setting as the textbook. These exercises should be constructed in such a way that teachers can select exercises on the basis of major types of errors committed.

SUPPORT COMPONENTS

Various support components, including a technical manual and appropriate record keeping materials will also be provided.

APPENDIX A

DESCRIPTION OF HEATH COMPONENTS

Heath has designed the set of student's text and accompanying teacher's edition to serve as the core of the mathematics program. A number of additional components are available as follows:

(1) Diagnostic Tests-A battery of tests, averaging 30-40 items per test, is provided on duplicating masters for Levels 3-6. Each test is designed to measure the instructional outcomes of a chapter. Three other tests measure the cumulative outcomes of several consecutive chapters. Test items run parallel to the instructional activities in the textbook.

(2) Basic Worksheets-Remedial practice exercises for Levels 1-6* are provided to assist the slower student to understand the basic mathematical concepts and increase his proficiency in computational skills. The exercises are correlated to the student's textbook, and they are also available on duplicating masters.

(3) Supplementary Worksheets-Enrichment exercises for Levels 1-6 are provided to assist the average and better students extend the topics presented in the textbook to a new setting. They are available in workbooks and on duplicating masters.

*Basic Worksheets for Levels 1-3 were not received from the publisher in time to be included in the analysis.

APPENDIX B

CONTENT ANALYSIS

APPENDIX D.C. HEATH INSTRUCTIONAL OUTCOMES LEVEL K

CHAPTER PAGES

CHAPTER PAGES		1 1-29	2 30-49	3 50-75	4 76-94
I.	STRUCTURE				
II.	SETS				
1.	Compare sets by indicating Equivalent sets Non-equivalent sets --Fewer --Fewest --More --Most One to one matching Subsets	25-26, 29(8) ^a 14, 16(8) 23(3) 13, 15(7) 24(2) 5-6(6)	38(4) 37(3)	52(3) 54(4) 65-66, 70(10)	
2.	Recognize the cardinal number property of a set.		30(4) 31(4) 33(4) 34(4) 45(4)	50(4)	76(4) 77(3) 33(2) 86(3)
3.	Introduce set operations Joining sets Separating sets			65-66(10)	82, 90(10)
4.	Use sets and regions to illustrate one-half.			74(2) 73-74(8)	
	Sets Regions				

^aNumerals refer to pages in the student text. Numeral in parentheses indicates the number of problems (to 10) in the chapter in which principal practice is on the outcome described.

^tDescriptor was included in publisher's scope and sequence, but no specific practice exercises were provided.

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL K

-16-

CHAPTER PAGES		1 1-29	2 30-49	3 50-75	4 76-94
III. NUMERATION		This outcome is implicit in several other outcomes throughout the level K textbook.			
1. Recognize and identify numerals 1-10.					
IV. NUMBER					
1. Recognize counting numbers from 1-10.			32, 35-36, 44, 46-49(10)	51, 53, 58-59, 61-64, 69, 71-72(10)	78, 84, 87-88, 91, 93(10)
2. Order whole numbers between 1-10.			41(1)	60(2)	
3. Recognize ordinal expressions First Last Middle				55, 57(5) 56-57(4) 57(1)	
4. Compare numbers using sets.					
5. Use sets to illustrate one-half.		(See II-1)			
		(See II-4)			
V. NUMBER SENTENCES					
VI. ADDITION AND SUBTRACTION					
1. Relate set operations to operations on whole numbers. Addition-joining sets		(See XI-3)			
Subtraction-separating sets.		(See II-3)			
VII. MULTIPLICATION AND DIVISION					
VIII. GEOMETRY				75(7)	79, 85, 92(10)
1. Compare shapes of objects					

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL K

CHAPTER PAGES	1 1-29	2 30-49	3 50-75	4 76-94
2. Recognize geometric concepts and figures. Inside Outside Polygons --Triangles --Quadrilaterals. --Rectangles --Squares --Circles	27-28(9)	40(7) 42(9) 43(7)	67-68(10)	81,89(9)
IX. MEASUREMENT 1. Compare heights. Taller Tallest Shortest Shortest Compare size. Larger Largest Smaller Smallest Same Compare length. Longer Longest Shorter Shortest	2(5) 12(1) 12(1) 4(5) 21(4) 3(5) 22(4) 11,17-18(10) 9(4) 10(6)			
X. PROBLEM SOLVING				
XI. PROBABILITY AND STATISTICS 1. Read and interpret a bar graph.				80,94(6)
XII. NUMBER THEORY				

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 1: CHAPTERS 1-5

-18-

CHAPTER	1	2	3	4	5
PAGES	1-24	25-52	53-70	71-94	95-132
I. STRUCTURE					
1. Recognize and use basic principles for operations: Additive identity (zero) Associative law for addition Commutative law for addition					126 127(10) 117, 123(10)
2. Use operation facts on whole numbers to complete square matrix boxes illustrating basic principles. Addition boxes					
II. SETS					
1. Complete mathematical equations represented by sets. Addition (joining) Subtraction (separating)				71, 74(10) 83-84(6)	98(4)
2. Use sets and regions to represent fractional numbers. Sets Regions					
3. Recognize set properties and relations. Cardinal number property of sets More-most Subset Equivalent sets One to one correspondence	11-28(10) 7-8(5) 3-4, 9-10(10) 1-4, 7(10)			71, 72(10)	
III. NUMERATION					
1. Identify place values represented by grouped objects with words (<u> </u> tens and <u> </u> ones), and standard numerals. To tens place To hundreds place					

D.C. HEATH INSTRUCTIONAL OUTCOMES

CHAPTER
PAGES

1-24 25-52 53-70 71-94 95-132

IV. NUMBER		1	2	3	4	5
		1-24	25-52	53-70	71-94	95-132
1. Use numbers and numerals to describe "how many".	Cardinal numbers to 9	15-16, 19, 20-24, (10)	26, 32-38, 40-42, 46-47, 52 (10)	58-59 (10)	91 (10)	
2. Identify missing numerals in counting sequence to 100.	Numerals in a sequence		33 (3)			
3. Represent moves (jumps) of more than one unit on the number line.	Number line			64 (1) 65-66 (10)	91 (2)	120 (10)
4. Recognize special numerical relationships and properties.	Even and odd numbers	(See XII-1)		67-70 (10)		
Ordinal numbers			35-36 (0)			
Fewer		23 (3)				
More		23 (3)				
Before			31, 49 (6)			
Between			31, 49 (8)			
After			31, 49 (6)			
V. NUMBER SENTENCES				60-61 (10)		
1. Complete number sentences using symbols $<$, $>$, $=$.						
2. Write "related number sentences".						
Addition - Subtraction						
3. Supply missing addends and sums for number sentences with frames.					80-81, 89-90 (10)	99, 101, 105-132 (10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 1

-20-

CHAPTER PAGES	1 1-24	2 25-52	3 53-70	4 71-94	5 95-132
4. Write sentences from number line and pictured sets.					
VI. ADDITION AND SUBTRACTION					
1. Recognize illustrations of addition, subtraction operations with sets.	(See II-1)				
2. Recognize representations of addition and subtraction with whole numbers on the number line.					119-120, 122, (10)
3. Read basic addition and subtraction facts for whole numbers through sums to 18.					
One more than	12-14, 21(10)	25, 27, 48(10)		72(8)	
One less than		48(6)		82(8)	101(10)
Missing addend				73-81, 83-84,	95-98, 102 105
Addition, subtraction of 1				87-90(10)	(10)
Addition, subtraction of 2					111-112, 117-118
Sums of 3 to 6					(10) 121-122, 129-132
Sums of 7 to 12 Practice				77-78, 80, 87-90(10)	99-101, 106-108, 110, 115-116(10)
4. Use algorithms to add whole numbers.					
Addition records					
--Tens and ones with no regrouping					
Vertical and standard form					
--2 digit numerals with no regrouping				73-74(10)	
Equation form				80	
Three addends					95(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 1

CHAPTER PAGES	1 1-24	2 25-52	3 53-70	4 71-94	5 95-132
5. Use algorithms to subtract whole numbers. Subtraction records --Tens and ones with no regrouping Vertical and standard form --2 digit numerals with no regrouping Equation form				83-84(10) 89-90	
VII. MULTIPLICATION AND DIVISION 1. Relate skip counting to multiplication				91(0)	120(0)
VIII. GEOMETRY 1. Identify basic geometric concepts, relationships and figures. Line segments Simple closed curves --Inside --Outside Basic shapes		30(5)	57(4)		
IX. MEASUREMENT 1. Compare heights Taller, tallest Shorter, shortest Compare size Larger, largest Smaller, smallest Same size			56(3)		
	5(6) 6(6)		54(6) 53(8) 55(6)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 1

-22-

CHAPTER PAGES	1 1-24	2 25-52	3 53-70	4 71-94	5 95-132
3. Measure line segments and objects to the nearest specified unit. Nearest unit Nearest inch Nearest centimeter					
4. Convert various units of measure. Pints to cups Quarts to pints Pounds to Tell time to the nearest half hour.				92-94(10)	
6. Recognize the monetary values of coins through dimes.					
X. PROBLEM SOLVING 1. Write stories for headlines.				80(1)	120(1)
XI. PROBABILITY AND STATISTICS 1. Draw and interpret bar graphs. 2. Collect data.		50(1)	62(1)	79(1)	114(1)
XII. NUMBER THEORY 1. Recognize special properties of numbers. Even and odd numbers					

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 1: CHAPTERS 6-10

CHAPTER PAGES	6 133-166	7 167-204	8 205-218	9 219-243	10 244-252
I. STRUCTURE					
1. Recognize and use basic principles for operations. Additive identity (zero) Associative law for addition Commutative law for addition	162(4)			222, 227-228(10)	
2. Use operation facts on whole numbers to complete square matrix boxes illustrating basic principles. Addition boxes		201-202(10)		229(8)	
II. SETS					
1. Complete mathematical equations represented by sets. Addition (joining) Subtraction (separating)		203-204(7)			
2. Use sets and regions to represent fractional numbers. Sets Regions			212, 214-218(10) 211-216, 218(10)		
3. Recognize set properties and relations. Cardinal number property of sets More-most Subset Equivalent sets One to one correspondence		203(6)			
III. NUMERATION					
1. Identify place values represented by grouped objects with words (tens and ones), and standard numerals. To tens place To hundreds place ^t	133-138, 145-153, 159(10)				

CHAPTER

PAGES

IV. NUMBER

1. Use numbers and numerals to describe "how many".

Cardinal numbers to 9

Zero

2. Identify missing numerals in counting sequence to 100.

Numerals in a sequence

Number line

3. Represent moves (jumps) of more than one unit on the number line.

4. Recognize ~~special~~ ^{essential} numerical relationships and properties.

Even and odd numbers

(See XII-1)

Ordinal numbers

Fewer

More

Before

Between

After

V. NUMBER SENTENCES

1. Complete number sentences / using symbols $<$, $>$, $=$.

2. Write "related number sentences".

Addition - Subtraction

Supply missing addends

and sums for number sentences with frames.

10
244-252

9
219-243

8
205-218

7
167-204

6
133-166

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 1CHAPTER
PAGES10
244-2529
219-2438
205-2187
167-2046
133-166

4. Write sentences from number line and pictured sets.

VI. ADDITION AND SUBTRACTION

1. Recognize illustrations of addition, subtraction operations with sets.
2. Recognize representations of addition and subtraction with whole numbers on the number line.
3. Read basic addition and subtraction facts for whole numbers through sums to 18.

One more than
One less than
Missing addend

Addition, subtraction of 1
Addition, subtraction of 2

Sums of 3 to 6
Sums of 7 to 12

Practice

4. Use algorithms to add whole numbers.

Addition records
--Tens and ones with no regrouping
Vertical and standard form
--2 digit numerals with no regrouping
Equation form
Three addends.

175, 178, 180, 185,
189, 193, 197, 203-
204(10)

(See II-1)

168, 172, 180, 185-
186, 189(10)

221, 224, 230(10)

140, 157, 158(10)
141, 158(10)

139-142(10)

167-168, 171-178,
183-188, 193-196
(10)

219-220, 223-224
227-230(10)

169-170, 179-182,
185-186, 189-192,
197-202(10)

225, 229-230
(10)

247

243-245(10)

245-247(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 1

-26-

CHAPTER

PAGES

6

133-166

7

167-204

8

205-218

9

219-243

10

244-252

5. Use algorithms to subtract whole numbers.

Subtraction records

--Tens and ones with no regrouping

Vertical and standard form

--2 digit numerals with no regrouping

Equation form

248-251(10)

251-252(10)

VII: MULTIPLICATION AND DIVISION

1. Relate skip counting to multiplication.

160(0)

VIII. GEOMETRY

1. Identify basic geometric concepts, relationships and figures.

Line segments

Simple closed curves

--Inside

--Outside

Basic shapes

236-238(10)

239(3)

239-240(10)

239-240(10)

28

IX. MEASUREMENT

1. Compare heights.

Taller, tallest

Shorter, shortest

Compare size.

Larger, largest

Smaller, smallest

Same size

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 1

CHAPTER		6	7	8	9	10
PAGES		133-166	167-204	205-218	219-243	244-252
3.	Measure line segments and objects to the nearest specified unit.	143-144(8)			233(4) 234(4)	
4.	Nearest unit Nearest inch Nearest centimeter Convert various units of measure.				235(5) 241(3)	
5.	Pints to cups Quarts to pints Pounds Tell time to the nearest half hour.			205-206(10)		
6.	Recognize the monetary values of coins through dimes.	163-164(10)		207-210(10)		
XI.	PROBLEM SOLVING Write stories for headlines.		176, 203(2)			
XI.	PROBABILITY AND STATISTICS 1. Draw and interpret bar graphs. 2. Collect data.					
XII.	NUMBER THEORY 1. Recognize special properties of numbers. Even and odd numbers				226(2)	

CHAPTERS	1	2	3	4	5	6
PAGES	1-32	33-61	62-84	85-100	101-132	133-143
I. STRUCTURE						
1. Recognize and use basic principles for operations.						
Addition identity (zero) ^t						
Multiplying by one law						
(identity)						
Associative (grouping)		39(9)			123(4)	
law for addition.						
Commutative law for						
addition						
29(6)						
Commutative law for						
multiplication						
2. Use operation facts on whole numbers to complete square matrix boxes for illustrating basic principles.						
Addition boxes		61(5)				
Addition-subtraction boxes						
II. SETS						
1. Interpret illustrations of mathematical operations with sets.						
Addition (joining)	13-16(10)					
Subtraction (separating)	17-19(10)					
Multiplication						
2. Use sets and regions to represent fractional numbers.						
Sets						140-141(10)
Regions						133-137, 141(10)
3. Recognize properties of sets.						
/ Cardinal number property of sets	1-4, 6(10)					
Equivalent sets						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 2

CHAPTER	1	2	3	4	5	6
PAGES	1-32	33-61	62-84	85-100	101-132	133-143
III. NUMERATION						
1. Identify place values represented by grouped objects with words (<u>tens</u> and <u>ones</u>), table (<u>tens/ones</u>), and standard numerals. To tens place To hundreds place				85-91(10)		
IV. NUMBER						
1. Use numbers and numerals to describe "how many". Cardinal numbers	2-4(10)					
2. Represent the order of numbers by writing numerals on the number line. Counting numbers Jumps on the number line Place numerals for	10(5) 11-12(10) 2-4, 22(10)			93(4)		
3. Recognize special properties of numbers. Even and odd numbers, Ordinal numbers	(See XII-1) 9(3)	47(6)				
4. Identify relationships between fractional numbers. Equivalent fractions						138(6)
V. NUMBER SENTENCES						
1. Complete number sentences using symbols $<$, $>$, $=$.	5(9)	56(10)		94(10)		
2. Write related number sentences. Addition Subtraction Multiplication	30(2) 30(2)	36, 44, 60(10) 36, 44, 60(10)			105, 108, 116, 122, 125 105, 108, 116 122, 125(10)	

CHAPTER

PAGES

1	2	3	4	5	6
1-32	33-61	62-84	85-100	101-132	132-143

3. Use frames as variables in number sentences.

4. Write number sentences from number line and pictured sets.

VI. ADDITION AND SUBTRACTION

1. Recognize illustrations of addition and subtraction operations with sets.

2. Recognize illustrations of addition and subtraction with whole numbers on the number line.

3. Recognize basic addition and subtraction facts for whole numbers through sums to 20.

--One more than

One less than

Missing addend

Sums less than 7

Sums of 7, 8, 9 and 10

Sums of 11, 12, 13, and 14

Practice

4. Use of algorithms to add whole numbers.

Addition records

--Tens and ones with no regrouping

--Hundreds, tens and ones with no regrouping

--Tens and ones with regrouping

(Letters and frames are used as variables throughout the test.)

	59(8)				102(8)
(See II-1)					
23-26(10)	34-35, 50, 59, (10)				
7(5) 7(5) 16, 20-21(10) 13-33(10) 33-34(10)					
	41, 49, 51, 57, 58 (10)				
22, 27-28(10)	38, 43-46, 52, 54 (10)	74, 78, 83(10)	99-101(10)	103, 107, 115, 121(10) 104, 109, 110, 113, 116-119, 124, 130-132/	142(10)

-31-

CHAPTER
PAGES

1	2	3	4	5	6
1-32	33-61	62-84	85-100	101-132	133-143

3. Relate multiplication to repeated addition.

4. Relate skip counting to the operation of multiplication

By 2's

By 4's

By 5's

By 10's

Other

5. Recognize basic multiplication facts for whole numbers through 5 x 9.

3 as a factor

4 as a factor

5 as a factor

Practice

Algorithms

--Equations

--Vertical form

VIII GEOMETRY

1. Recognize and identify basic geometric concepts, relationships and figures.

Line segment

End points

Simple closed curve

Polygons

--Triangle

--Square

--Rectangle

--Side of a figure

Congruent figures

--Tracing

--Fitting

Diagonals

Square corners

Symmetry

Circle

--Radian

--Diameter

--Center

95(1)

96(1)

95(1)

86, 97, 98, (10)

96(1)

129(5)

66(5)

66(5)

82(3)

81-82(8)

63-64(1)

D. C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 2CHAPTER
PAGES1
1-322
33-613
62-844
85-1005
101-1326
133-143

IX MEASUREMENT

1. Measure line segments and objects to the nearest specified unit.

Nearest unit.

Nearest inch

Nearest centimeter

Nearest foot

2. Measure the area covered by regular and irregular figures by counting square units.

3. Convert various units of measure.

Feet to inches

Yards to feet

Pints to cups

Quarts to pints

4. Tell time to the nearest quarter hour.

5. Measure temperature by reading a Fahrenheit thermometer

6. Recognize the monetary values of coins through quarters

7. Complete and interpret a month calendar.

X. PROBLEM SOLVING

1. Solve word problems involving addition and subtraction

2. Write headlines for stories and stories for headlines.

67-68 (8)

69-73 (10)

70-72 (10)

75 (4)

128 (2)

62, 77 (10)

84 (3)

106, 110, 120,
127 (10)

78 (1)

94 (1)

110, 127 (2)

MATH D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 2

-34-

CHAPTER		1	2	3	4	5	6
PAGES		1-32	33-61	62-84	85-100	101-132	133-143
XI. PROBABILITY AND STATISTICS	1. Draw and interpret bar graphs.	8, 32(7)	40, 48(2)			112, 114(5)	143(5)
	2. Collect data.						
XII. NUMBER THEORY							
1. Recognize special properties of numbers.							
Factors							
Even and odd numbers							

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 2

CHAPTER STRUCTURE	7 144-166	8 167-180	9 181-192	10 193-214	11 215-226	12 227-252
1. Recognize and use basic principles for operations. Addition identity (zero) t Multiplying by one law (identity) t Associative (grouping) law for addition Commutative law for addition Commutative law for multiplication Use operation facts on whole numbers to complete square matrix boxes illustrating basic principles. Addition boxes 162(8) Addition-subtraction boxes						234(8)
II. SETS 1. Interpret illustrations of mathematical operations with sets. Addition (joining) Subtraction (separating) Multiplication Use sets and regions to represent fractional numbers.		171(10)		209(8) 210(6)		227-228, 233 (10)
2. Sets Regions Recognize properties of sets. Cardinal number property of sets Equivalent sets						227-228, 233(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 2.

-36-

CHAPTER PAGES		7 144-166	8 167-180	9 181-192	10 193-214	11 215-226	12 227-252
III. NUMERATION							
1. Identify place values represented by grouped objects with words (<u>tens</u> and <u>ones</u>), table (<u>tens/ones</u>), and standard numerals.							
To tens place		151(8)	173(3)		193-195, 197 (10)		
To hundreds place							
IV. NUMBER							
1. Use numbers and numerals to describe "how many".							
Cardinal numbers							
2. Represent the order of numbers by writing numerals on the number line.							
Counting numbers							
Jumps on the number line							
Place numerals for							
3. counting numbers in order.							
4. Recognize special properties of numbers.							
Ordinal numbers							
5. Identify relationships between fractional numbers.							
Equivalent fractions							

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 2

CHAPTER PAGES	7 144-166	8 167-180	9 181-192	10 193-214	11 215-226	12 227-252
4. Use algorithms to add whole numbers.						
Addition records						
--Tens and ones with no regrouping	145-148(10)					
--Hundreds tens and ones with no regrouping						
--Tens and ones with regrouping	152-153(5)			201(3)		
Vertical and standard form						
--2, 3 digit numerals no regrouping	149(10)			202(10)		
--2, 3 digit numerals with regrouping	154, 156, 161, 165(10) 163(4)					
Expanded form						
Equation form						
Three addends						
5. Use algorithms to subtract whole numbers.						
Subtraction records						
--Tens and ones with no regrouping		167-169(10)				
--Hundreds, tens and ones with no regrouping						
--Tens and ones with regrouping		173-175(10)		205-206(8)		
Vertical and standard form						
--2 and 3 digit numerals with no regrouping		170(10)		207(8)		
--2 digit numerals with regrouping		176(10)		210(6)		
Expanded form						
Equation form	17-21(10)					

V. NUMBER SENTENCES

1. Complete number sentences using symbols $<$, $>$, $=$.
2. Write related number sentences.

Addition

Subtraction

Multiplication

3. Use frames as variables in number sentences.

4. Write number sentences from number line and pictured sets.

(Letters and frames are used as variables throughout the text.)

VI. ADDITION AND SUBTRACTION

1. Recognize illustrations of addition and subtraction operations with sets.
2. Recognize illustrations of addition and subtraction with whole numbers on the number line.
3. Recognize basic addition and subtraction facts for whole numbers through sums to 20.

One more than

One less than

Missing addend

Sums less than 7

Sums of 7, 8, 9 and 10

Sums of 11, 12, 13, and 14

Practice

198(6)

230(8)

231-232(10)

144(8)

156, 160, 161,
165(10)

178, 179(10)

184(10)

199, 211, 212
(10)

224, 226(10)

242, 247, 252(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 2CHAPTER
PAGES

	7 144-166	8 167-180	9 181-192	10 193-214	11 215-226	12 227-252
VII MULTIPLICATION AND DIVISION						
1. Illustrate the multiplication operation with sets.						
2. Illustrate the multiplication operation on the number line.						
3. Relate multiplication to repeated addition.						231-232(10)
4. Relate skip counting to the operation of multiplication.						
By 2's						
By 4's						
By 5's						
By 10's				196(3) 213(3)		
Other						
5. Recognize basic multiplication facts for whole numbers through 5 x 9.						
3 as a factor						244-245(10)
4 as a factor						248-249(10)
5 as a factor						238-239(10)
Missing factor						235, 245, 249, 250 (10)
Practice						246, 247, (10)
Algorithms						250-252
--Equations						239, 245, 249(10)
--Vertical form						
VIII GEOMETRY						
1. Recognize and identify basic geometric concepts, relationships and figures.						
Line segment						
End points						
Simple closed curve						
Polygons						
--Triangle					220-221(5)	
--Square						
--Rectangle						
--Side of a figure						
Congruent figures						216(3)
--Tracing					215-216(9)	
--Fitting					220(2)	
Diagonals					221(3)	
					217(8)	

CHAPTER

PAGES

7

144-166

8

167-180

9

181-192

10

193-214

11

215-226

12

227-252

Square corners

Symmetry

Circle

/--Radian

--Diameter

--Center

219(5)

222, 225(3)

218(3)

218(3)

218(2)

IX. MEASUREMENT

1. Measure line segments and objects to the nearest specified unit.

Nearest unit

Nearest inch

Nearest centimeter

Nearest foot

2. Measure the area covered by regular and irregular figures by counting square units.

3. Convert various units of measure.

Feet to inches

Yards to feet

Pints to cups

Quarts to pints

4. Tell time to the nearest quarter hour.

5. Measure temperature by reading a Fahrenheit thermometer

6. Recognize the monetary values of coins through quarters.

7. Complete and interpret a month calendar.

183(2)

183(2)

190(5)

190(5)

185-187(10)

181(2)

191-192(10)

204(1)

X. PROBLEM SOLVING

1. Solve word problems involving

Addition and subtraction

Multiplication

172,180(10)

155,164(10)

236,241(8)

241(2)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 2

CHAPTER PAGES	7 144-166	8 167-180	9 181-192	10 193-214	11 215-226	12 227-252
2. Write headlines for stories and stories for headlines.	164(1)					236(1)
XI. PROBABILITY AND STATISTICS						
1. Draw and interpret bar graphs.						
2. Collect data t.						243(1)
XII NUMBER THEORY						
1. Recognize special properties of numbers.						
Factors t						
Even and odd numbers				214(2)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3: CHAPTERS 1-6

-42-

CHAPTER PAGES	1 1-27	2 28-61	3 62-79	4 80-113	5 114-133	6 134-171
I. STRUCTURE						
1. Recognize and use basic principles for operations.						
Additive identity (zero)		42(3)/DT(1) ^b				139(8)
Multiplying by one law (identity)						139(8)
Multiplying by zero law						
Zero as a dividend						
Distributive law of multiplication over addition		44(10)/DT(2)				
Associative (grouping) law for addition		42(6)/DT(2)				
Commutative law for addition						
Commutative law for multiplication						140(6)
2. Use operation facts on whole numbers to complete square matrix boxes illustrating basic principles.						
Addition boxes	43, 47, 57(10)			86, 88, 90(10)	119(3).	
Subtraction boxes						
SETS						
Interpret illustrations of mathematical operations with sets.						
Addition (joining)		28(3)				135(9)
Subtraction (separating)		29(4)				155 157(10)
Multiplication						
Division						
2. Use sets and regions to represent fractional numbers.						
Sets						
Regions						

^bNumeral preceded by DT refer to the number of items, relating specifically to the outcome desired, which appear in the Diagnostic Test for this chapter.

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 3

CHAPTER

PAGES

1

1-27

2

28-61

3

62-79

4

80-113

5

114-133

6

134-171

III. NUMERATION

1. Identify place values represented by grouped objects with words (tens and ones), tables. (tens/ones), and standard numerals.

To tens place
 To hundreds place
 To thousands place
 To hundred thousands place
 To millions place

2. Relate decimal system measures by rewriting monetary values in different units.

10-11(10)
 /DT(6)

IV. NUMBER

1. Represent the order of numbers by writing numerals on the number line.

Tens, hundreds, thousands
 Fractions

5, 8, 15(10)

2. Recognize special properties of numbers.

Even and odd numbers
 Multiples
 Ordinal numbers
 Skip counting
 Counting by tens

(See XII-1)
 (See XII-1)
 9(10)

3-4(10)

108(8)

3. Identify relationships between fractional numbers.

Comparing fractions
 Equivalent fractions

V. NUMBER SENTENCES

1. Complete number sentences using symbols $<$, $>$, $=$.

19(10)/DT(4)

87,100(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

CHAPTER

PAGES

	1 1-27	2 28-61	3 62-79	4 80-113	5 114-133	6 134-171
2. Write related number sentences. Addition, subtraction Multiplication, division		32(10)/DT(6)			122(10)	135, 149, 155-157(10) /DT(10)
3. Use letters and frames as variables in number sentences.						
4. Write number sentences to solve verbal problems.	(Letters and frames are used as variables throughout the text). (See X)					
5. Write number sentences from number-line pictures.		31(8)		80, 91(10)	114(6)	136(10) /DT(1)
6. Graph addition and multiplication sentences.				92(1)		148(1)
VI. ADDITION AND SUBTRACTION	(See II-1)					
1. Recognize illustrations of addition and subtraction operations with sets.						
2. Recognize illustrations of addition and subtraction with whole numbers on the number line.		31(8)		80(8)	114(6)	
3. Recognize the inverse relationship between the operations of addition and subtraction.		53(5)			123(9)	
4. Read basic addition and subtraction facts for whole numbers through sums to 18.		30-35, 39, 41, 43, 45, 47-53, 55-59, (10), /DT(10)		113(10)		
5. Use algorithms to add whole numbers. Addition records --Tens and ones with no regrouping --Hundreds, tens and ones with no regrouping				81(10) 82(8)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

CHAPTER PAGES	1 1-27	2 28-61	3 62-79	4 80-113	5 114-133	6 134-171
--Tens and ones with re-grouping --Hundreds, tens and ones with regrouping Vertical and standard form --2, 3 digit numerals with no regrouping --2, 3 digit numerals with regrouping Expanded form Three addends Computer function model Equation form Magic squares Use algorithms to subtract whole numbers. Subtraction records --Tens and ones with no regrouping ^t --Hundreds, tens and ones with no regrouping --Tens and ones with regrouping --Hundreds, tens and ones with regrouping Vertical and standard form --2 and 3 digit minuends with no regrouping --2 and 3 digit minuends with regrouping Expanded form ^t Computer function model Equation form	1-27	28-61	62-79	80-113 84-85(10) 96(10) 83(10) 86-87, 90, 97, 100, 103, 107, 110(10)/DT(10) 88(4) 93, 105(10) 91(10)	114-133	134-171
		45, 55, 57(10) /DT(5) 41, 52-53(10) 30-34, 42, 49-50, 53(10) 60(1)			115(10) 118-119(10) 124-125(10) 116(10) 120, 122, 126, 128, 130, 132(10) /DT(10) 119(5) 114, 122(10)	171(1)
		41, 52-53(10) 30-34, 42, 53(10)				

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3CHAPTER
PAGES

1

2

3

4

5

6

1-27

28-61

62-79

80-113

114-133

134-171

VII. MULTIPLICATION AND DIVISION

(See II-1)

1. Recognize illustrations of multiplication and division with sets.

2. Recognize illustrations of multiplication on the number line.

3. Relate multiplication to repeated addition.

4. Relate division to repeated subtraction.

5. Recognize inverse relationship between multiplication and division.

6. Recognize basic multiplication and division facts for whole numbers through 9×9 .

7. Use algorithms to multiply whole numbers.

Multiplication records

--Tens and ones with no regrouping

--Tens and ones with regrouping

--Hundreds, tens and ones with no regrouping

Standard form

--2 digit with no regrouping

--2 digit with regrouping

--3 digit with no regrouping

--3 digit with regrouping

Equations

--Multiplication

--Multiplication - addition

136,162(10)

149(5)

166(3)

165(3)

136-138,141-
143,146-147,
149-150,157-
158,162-163,
(10)/DT(10)

156,162(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

CHAPTER PAGES	1 1-27	2 28-61	3 62-79	4 80-113	5 114-133	6 134-171
8. Use algorithms to divide whole numbers. Missing factor Standard (long division) form 1 digit divisors With remainders Equations						137, 156(10)
9. Relate division to fractional part of a quantity.						155-156, 162-163(10)
VIII. GEOMETRY						
1. Recognize and identify basic geometric concepts, relationships and figures.						
Line segment						
End points						
Polygons						
--Triangle						
--Quadrilateral						
--Square						
--Rectangle						
--Side of a figure						
Congruent figures						
Corresponding parts						
Fitting						
Line of symmetry						
Tracing						
Circle						
--Radius						
--Diameter						
--Center						
Cube						
Sphere						
Pyramid						

CHAPTER PAGES	1 1-27	2 28-61	3 62-79	4 80-113	5 114-133	6 134-171
IX. MEASUREMENTS						
1. Measure line segments and objects to the nearest specified unit.						
Nearest unit			62(3)			
Nearest inch			63-64, 69(10) /DT(4)			
Nearest $\frac{1}{2}$ inch			66, 69(10) /DT(3)			
Nearest $\frac{1}{4}$ inch			67, 69, 73(10) /DT(1)			
Nearest centimeter			70-71(10) /DT(4)			
Nearest decimeter			74, 75(10) /DT(6)			
2. Measure the area covered by regular and irregular figures by counting square units.						
3. Measure the volume of regular and irregular solids by counting cubic units.						
4. Convert various units of measure.						
Decimeters to centimeters						
Pint to quart						
Cup to pint						
Pint to half and full gallon						
Quart to half and full gallon						
Feet to inches						
Yards to feet						
5. Tell time to the nearest minute.	17(10)/DT(3)	38(10)				154, 167(10) /DT(3)
6. Measure temperature by reading a Fahrenheit thermometer.						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

CHAPTER PAGES	1 1-27	2 28-61	3 62-79	4 80-113	5 114-133	6 134-171
7. Recognize the monetary values of coins through half dollars, and one dollar bills.	10-11(10)			98(10)/DT(7)		
8. Recognize and interpret scale measuring weights in pounds.						
9. Estimate the length of line segments and related objects to the nearest inch.			65, 73(10)			
X. PROBLEM SOLVING						
1. Solve word problems involving Addition and subtraction		36-37, 40, 46 (10)		101(7)/DT(4)	117, 127, 131 (10)/DT(4)	144-145, 159- 161, 168(10) /DT(3)
Multiplication and division						
Fractions						
2. Solve word problems involving Money Weight Time Linear measure	16, 18(10) 18(1)	54(6)/DT(2)		89(10)		
3. Write headlines for stories and stories for headlines.	25(1)	37, 40, 46, 54(4)		101, 104(2)	117, 127, 131 (3)	145, 159, 161, 168(4)
4. Write equations on a computer card model to solve word problems.				106(6)		
XI. PROBABILITY AND STATISTICS						
1. Draw and interpret. Tables Bar graphs Line graphs	21-22(10)			92(1)		148(1)

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 3

-50-

CHAPTER PAGES	1 1-27	2 28-61	3 62-79	4 80-113	5 114-133	6 134-171
2. Collect data						
3. Make predictions ^t						
XII. NUMBER THEORY						
1. Recognize special properties of numbers.						
Factors						
Multiples						137-139(10)
Even and odd numbers				108(2)		153(10)
CHAPTER REVIEWS	26(10)	59(10)	76(10)	110(10)	132(10)	170(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3: CHAPTERS 7-11

CHAPTER PAGE	7 172-193	8 194-211	9 212-251	10 252-269	11 270-295
I. STRUCTURE					
1. Recognize and use basic principles for operations.					
Additive identity (zero)					
Multiplying by one law (identity)					
Multiplying by zero law					
Zero as a dividend					
Distributive law of multiplication over addition					
Associative (grouping) law for addition					
Commutative law for addition					
Commutative law for multiplication					
2. Use operation facts on whole numbers to complete square matrix boxes illustrating basic principles.					
Addition boxes					
Subtraction boxes					
II. SETS					
1. Interpret illustrations of mathematical operations with sets.					
Addition (joining)					
Subtraction (separating)					
Multiplication					
Division					
2. Use sets and regions to represent fractional numbers.					
Sets					
Regions					

291(7)

214-217(10)

243(6)

196(10)/DT(3)
194-195(10)
/DT(10)

CHAPTER
PAGE7
172-1938
194-2119
212-25110
252-26911
270-295

.III. NUMERATION

1. Identify place values represented by grouped objects with words (tens and ones), tables (tens/ones), and standard numerals.

To tens place

To hundreds place

To thousands place

To hundred thousands

place

To millions place

2. Relate decimal system

measures by rewriting monetary values in different units.

IV. NUMBER

1. Represent the order of numbers by writing numerals on the number line.

Tens, hundreds, thousands

Fractions

2. Recognize special properties of numbers.

Even and odd numbers

Multiples

Ordinal numbers

Skip counting

Counting by tens

3. Identify relationships

between fractional numbers.

Comparing fractions

Equivalent fractions

V. NUMBER SENTENCES

1. Complete number sentences using symbols $<$, $>$, $=$.

277(10)

288(2)

202(7)

197(5)

201, 203(10)

237(9)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

CHAPTER

PAGE

7
172-1938
194-2119
212-25110
252-26911
270-295

2. Write related number sentences.

Addition, subtraction

Multiplication, division

Use letters and frames

3. as variables in number sentences.

4. Write number sentences to

solve verbal problems.

5. Write number sentences

from number line pictures.

6. Graph addition and

multiplication sentences.

VI. ADDITION AND SUBTRACTION

1. Recognize illustrations of

addition and subtraction oper-

ations with sets.

2. Recognize illustrations of

addition and subtraction with

whole numbers on the number

line.

3. Recognize the inverse

relationship between the

operations of addition and

subtraction.

4. Read basic addition and

subtraction facts for whole

numbers through sums to 18.

5. Use algorithms to add

whole numbers.

Addition records

--Tens and ones with no

regrouping

--Hundreds, tens and

ones with no regrouping

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

-54-

CHAPTER PAGE	7 172-193	8 194-211	9 212-251	10 252-269	11 270-295
<p>--Tens and ones with re- grouping --Hundreds, tens and ones with regrouping Vertical and standard form --2, 3 digit numerals with no regrouping --2, 3 digit numerals with regrouping Expanded form Three addends Computer function model Equation form Magic squares Use algorithms to subtract whole numbers. Subtraction records --Tens and ones with no regrouping --Hundreds, tens and ones with no regrouping --Tens and ones with re- grouping --Hundreds, tens and ones with regrouping Vertical and standard form --2 and 3 digit minuends with no regrouping --2 and 3 digit minuends with regrouping Expanded form Computer function model Equation form</p>			234(8)		
			235(8)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3CHAPTER
PAGES

7	8	9	10	11
172-193	194-211	212-251	252-269	270-295

VII. MULTIPLICATION AND DIVISION

1. Recognize illustrations of multiplication and division with sets.

2. Recognize illustrations of multiplication on the number line.

3. Relate multiplication to repeated addition.

4. Relate division to repeated subtraction.

5. Recognize inverse relationship between multiplication and division.

6. Recognize basic multiplication and division facts for whole numbers through 9×9 .

7. Use algorithms to multiply whole numbers.

* Multiplication records

--Tens and ones with no regrouping

--Tens and ones with regrouping

--Hundreds, tens and ones with no regrouping

Standard form

--2 digit with no regrouping

--2 digit with regrouping

--3 digit with no regrouping

--3 digit with regrouping

Equations

--Multiplication

--Multiplication - addition

223(6)

/DT(1)

212, 218-219,
225, 231-233,
237(10)/DT(10)213(8)
240-241, 247,
(10)/DT(3)

272-273(10)

/DT(5)

278-279(10)

/DT(5)

285(10)

274(10)/DT(5)

280-282(10)

/DT(5)

286(10)

286(10)

270-271(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

-56-

CHAPTER
PAGES11
270-29510
252-2699
212-2518
194-2117
172-193

8. Use algorithms to divide whole numbers.

Missing factor

Standard (long division) form

1 digit divisors

With remainders

Equations

9. Relate division to

fractional part of a quantity.

232-233, 244-246

(10)

244-246(10)/DT(10)

294(10)/DT(4)

290, 292(10)

204-205(10)

/DT(6)

258-259(1)

258-259(3)

258-259(4)

258-259(1)

268(1)

268(1)

268(1)

VIII. GEOMETRY

1. Recognize and identify basic geometric concepts, relationships and figures.

Line segment

End points

Polygons

--Triangle

--Quadrilateral

--Square

--Rectangle

--Side of a figure

Congruent figures

Corresponding parts

Fitting

Line of symmetry

Tracing

Circle

--Radius

--Diameter

--Center

Cube

Sphere

Pyramid

172-173(6)/DT(4)

172-173(6)/DT(4)

177-178(2)

178(5)

178(1)/DT(3)

178(3)/DT(3)

174(10)

180-183(10)/DT(1)

184-185(10)/DT(2)

185(6)

188-191(10)/DT(6)

175(5)/DT(1)

D.C. HEALTH INSTRUCTIONAL OUTCOMES
LEVEL 3CHAPTER
PAGES

7	8	9	10	11
172-193	194-211	212-251	252-269	270-295

IX. MEASUREMENTS

1. Measure line segments
objects to the nearest speci-
fied unit.

Nearest unit
Nearest inch
Nearest $\frac{1}{2}$ inch
Nearest $\frac{1}{4}$ inch
Nearest centimeter
Nearest decimeter

2. Measure the area covered
by regular and irregular figures
by counting square units.
3. Measure the volume of
regular and irregular solids by
counting cubic units.

4. Convert various units of
measure.

Decimeters to centimeters

Pint to quart

Cup to pint

Pint to half and full

gallon

Quart to half and full

gallon

Feet to inches

Yards to feet

5. Tell time to the nearest
minute.

6. Measure temperature by
reading a Fahrenheit thermometer.

265(4)

265(4)

256(9)

254(7)/DT(2)

255(6)/DT(2)

257(10)/DT(4)

264(3)

264(3)

264(3)

264(3)

252(10)/DT(3)

252(10)/DT(3)

265(3)

262-263(10)

/DT(3)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

-58-

CHAPTER

PAGES

7

172-193

8

194-211

9

212-251

10

252-269

11

270-295

7. Recognize the monetary values of coins through half dollars, and one dollar bills.

8. Recognize and interpret scale measuring weights in pounds.

9. Estimate the length of line segments and related objects to the nearest inch.

X. PROBLEM SOLVING

1. Solve word problems involving Addition and subtraction Multiplication and division

Fractions

198-199, 206
(10)/DT(4)220-221, 223
234-236, 249(10)
/DT(4)276, 284(10)
/DT(6)

52. Solve word problems involving

Money,
Weight
Time

239(8)

283(10)

Linear measure

3. Write headlines for stories and stories for headlines.

221, 223, 234,
245, 248-249(6)275, 276, 281,
284, 291, 294(10)

4. Write equations on a computer card model to solve word problems.

XI. PROBABILITY AND STATISTICS

1. Draw and interpret.

Tablet

Bar graphs

Line graphs

261(6)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 3

CHAPTER	7	8	9	10	11
PAGES	172-193	194-211	212-251	252-269	270-295
2. Collect data					
3. Make predictions ^t				261(3)	
XII. NUMBER THEORY					
1. Recognize special properties of numbers.					
Factors					
Multiples			224, 242 (10)		
Even and odd numbers					
CHAPTER REVIEWS	192(10)	208(10)	250(10)	266(10)	295(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4: CHAPTERS 1-7

-60-

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
I. STRUCTURE							
1. Recognize and use basic principles for operations.							
Additive identity-zero							
Multiplying by one law (identity)					96(10)		
Multiplying by zero law					96(10)		
Zero as a dividend					109-111(10)		
Distributive law of multiplication			37(6)		<u>25(7)^c</u>		<u>176(6)</u> <u>/39(4)</u>
Associative (grouping) law for addition			37(3)		95(1)		
Commutative law for addition					95(4)		
Associative (grouping) law for multiplication							
Commutative law for multiplication							
2. Use operation facts on whole numbers to complete square matrix boxes illustrating basic principles.							
Addition boxes			35, 38, 42 44(10) 35, 49-50 54, 58(10)		99(3)		
Subtraction boxes							
Multiplication boxes					119(3)		<u>163, 178(8)</u>
3. Complete square matrix addition boxes which illustrate basic principles using fractions and mixed numerals.							

Underlined entries refer to pages and items with specific practice in the Basic Worksheet for this level.

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
II. SETS							
1. Interpret illustrations of operations with sets.							
Addition (joining)							
Subtraction (separating)			32(1) 32(1)		88(6)/19(7) 101(10) /21-24(10)		152-153(7)
Multiplication							
Division							
2. Use sets and regions to represent fractional numbers.						126-127(10) /26(8)/DT(2) 124-125(10) /27(7)/DT(4)	
Sets							
Regions							
III. NUMERATION							
1. Identify place values represented by grouped objects with words (<u> </u> tens and <u> </u> ones), tables (<u> </u> tens/ones), and standard numerals.							
To hundreds place		20-22(10) /DT(6)/ /1,2(10) 23-25(10) /DT(8) /3(3) 24-25(10) /DT(5) 26(10) /DT(1)					
To thousands place							
To hundred thousands place							
To millions place							
2. Relate Hindu-Arabic and Roman numerals through XXXIX by rewriting.							
Roman to Hindu-Arabic							
Hindu-Arabic to Roman		29(10) 29(10)					

3. Relate decimal system measures by rewriting expressions in different units. Money (dollars and cents)

Metric system (kilometers, meters and centimeters)

80(10)

80-81(10)

IV. NUMBER

1. Represent the order of numbers by writing numerals on the number line.

Tens and hundreds

Fractions

Mixed numerals

2. Recognize special properties of numbers.

Even and odd numbers

Multiples

Factors and common

factors

Prime numbers

Perfect numbers

3. Identify relationships between fractional numbers.

Numerator - denominator

Comparing fractions

Equivalent fractions

Reducing fractions

Rewriting fractions as mixed numerals

Rewriting mixed numerals as fractions

21(2)

128-129(10)

(See XII-1)

(See XII-1)

(See XII-1)

(See XII-1)

(See XII-1)

127(10)

125(8)

/DT(4)

129-132(10)

150/DT(7)

133(10)

/DT(4)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4CHAPTER
PAGES

1

2

3

4

5

6

7

152-185

V. NUMBER SENTENCES

1. Complete number sentences using symbols $<$, $>$, $=$.
2. Write related number sentences.

Addition, subtraction
Multiplication, division

Fraction, division.

Multiplication, addition

3. Use letters and frames as variables in number sentences. (Letters and frames are used as variables throughout the text).

4. Write number sentences to solve problems. (See also X)

5. Write number sentences involving units of measure. (See X-2)
6. Write number sentences from number-line pictures.

Recognize the use of parentheses to show grouping.

8. Graph addition and multiplication sentences.

VI. ADDITION AND SUBTRACTION

1. Recognize illustrations of addition and subtraction operations with sets. (See II-1)

2. Recognize illustrations of addition and subtraction operations on the number line.

Whole numbers

Fractional numbers

3. Recognize the inverse relationship between the operations of addition and subtraction.

D. C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
4. Relate a slide rule model to the operations of addition and subtraction.							
5. Review basic addition and subtraction facts for whole numbers through sums to 18.			34-38(10) <u>/4-7(10)</u>		116(5)		
6. Estimate sums and differences of whole numbers.							
7. Use algorithms to add whole numbers.							
Vertical and standard form							
--2, 3 and 4 digit numerals with no regrouping			40(10)/8(6) <u>/DT(1)</u>				
--2, 3, 4 and n digit numerals with regrouping			41, 42, 44, 58 (10)/9-10, <u>18(10)/DT(6)</u> 38, 39, 46, 47 (10)/11(9) <u>/DT(2)</u> 48(3) 51(5) 34(10)				
Three or more addends							
Doubling							
Computer function model							
Equation form							
Use algorithms to subtract whole numbers.							
Vertical and standard form							
--2 and 3 digit minuends with no regrouping			49(10)/DT(2) <u>/12(5)</u>				
--3, 4 and n digit minuends with regrouping			<u>/13-17(10)</u> <u>/DT(8)</u> 51(7) 32-34(10)				
Computer function model							
Equation form							

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4CHAPTER
PAGES

1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
9. Use algorithms to add and subtract rational numbers.						
Fractions						
--Like denominators						
--Unlike denominators					136-137, 148 (10)/28-29 (10)/DT(6) 138-139, 148 (10)/30-31 (10)	
Mixed numerals						
--Like denominators						
--Unlike denominators						
VII. MULTIPLICATION AND DIVISION						
1. Illustrate the multiplication and division operations with sets.						
2. Illustrate operations on the number line.						
Multiplication				89(10) 104(10)		
Division						
Multiplication-addition				90(10)		
3. Relate multiplication to repeated addition.						
4. Relate division to repeated subtraction.						
5. Recognize inverse relationship between multiplication and division.				116(5) /DT(2)		
6. Review basic multiplication and division facts through 9 x 9.				88-89, 91-94, 105, 112, 113 (10)/19-24, (10)/DT(10)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

-66-

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
7. Multiply by special factors. 10 100 20, 30							165, 167(10) /DT(2) 166, 167(10) /DT(3) 169-170(10) /38(4)/DT(4)
8. Estimate products and quotients of whole numbers. Products Quotients Use algorithms to multiply whole numbers. Multiplication records --Tens and ones with no regrouping --Tens and ones with regrouping --Hundreds, tens and ones with no regrouping --Hundreds, tens and ones with regrouping Standard form --2 digit with no regrouping --2 digit with regrouping --3 digit with no regrouping --3 digit with regrouping Equations --Multiplication --Multiplication - addition Multiplying machine model							153(5)/34(5) 155(10)/35(5) 159(10)/36(5) 160(10)/37(5) 154(10) 156(10)/40-41 (9)/DT(10) 157(0)/DT(9) 161(10) 140-141(10)
					88, 90(10) /DT(10)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
10. Use algorithms to divide whole numbers. Missing factor Using multiplication facts to aid in division Division records --Tens and ones with no regrouping --Tens and ones with regrouping --Hundreds, tens and ones with no regrouping --Hundreds, tens and ones with regrouping Standard (long division) form --1 digit divisors --2 digit divisors --With remainders (introduction) Checking (introduction) Equations					91,102(10)		
11. Division machine model Relate division to fractional part of a quantity.					103(10) <u>21-24(10)</u> 101,103(10) /DT(10)	140-141(10) 142,144-146(10) /32-33(10) /DT(7)	
VIII. GEOMETRY 1. Recognize and identify basic geometric concepts, relationships and figures. Line segment End points Lines Rays	1-2(10)/DT(2) 1-2(10)						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

-68-

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
Planes	3(4)						
Simple closed curves	4(4)						
Polygons							
--Triangle	5(2)/DT(1)						
--Quadrilateral	5(2)/DT(3)						
--Squares	5(2)/DT(1)						
--Trapazoid	6-7(3)						
--Kite	6(1)/DT(1)						
--Pentagon	7(2)/DT(1)						
--Hexagon	7(2)/DT(1)						
--Octagon	7(2)/DT(1)						
--Diagonals		31(3)					
Congruent figures	8-9(10)/DT(1)						
Corresponding parts	10(3)/DT(2)						
Fitting	11, 14-15(10)						
Line of symmetry	12, 15(6) /DT(4)						
Turns	16, 17(8)						
Tracing	19(9)						
Angles							
--Side							
--Vertex							
Congruent angles							
Right angles							
Perpendicular lines							
Parallel lines							
Circle							
--Radius							
--Diameter							
--Center							
2. Make a scale drawing.							184(1)
IX. MEASUREMENT							
1. Measure line segments to the nearest specified unit.							
Nearest unit							
Nearest $\frac{1}{4}$ inch							
Nearest $\frac{1}{8}$ inch							
Nearest centimeter							
Nearest decimeter							

66-68(9)/DT(2)
64(7)/DT(2)
65(10)
78(10)/DT(1)
78(4)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
2. Measure perimeter of polygons.				69(5)/DT(2)			
3. Measure radius, diameter and circumference of circles.				70(6)			
4. Measure the area covered by irregular figures by counting.				73(6)/DT(3) 74(2) 82-83(7)			
5. Measure the volume of regular and irregular solids by counting.				76(7)/DT(3) 77(4) 84(4)			
6. Define and convert various units of measure. Inches to feet Feet to yards Yards to inches Miles to feet Square feet to square yards Decimeters to centimeters Meters to decimeters and centimeters Kilometers to meters Dollars to cents				71(6)/DT(1) 71(6)/DT(2) 71(6) 72(6) 75(10) 79(4)/DT(2) 79-80(10) /DT(2) 81(6) 80(10)			
7. Estimate surface area of rectangular solids by counting square units.							
8. Recognize and use measures for, Time Weight in pounds Liquid measure							

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

-70-

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	7 152-185
X. PROBLEM SOLVING							
1. Solve word problems involving.			36, 43, 57 (10) /DT(4)		106-107, 118 (10) 108 (10) /DT(2)		179 (4)
Addition and Subtraction						143, 147 (10)	171, 179 (8) /DT(4)
Multiplication and division							
Fractions and mixed numerals							
Estimation							
2. Solve word problems involving.			60 (6) /DT(4) 53 (4) /DT(1)		108 (10)		164 (10)
Money							
Weight							
Time							
Linear measure							
3. Write headlines for stories and stories for headlines.			36, 43, 53, 57 (4)		106-107, 118 (3)	143, 147 (2)	173 (1)
4. Write equations on a computer card model to solve word problems.					117 (6)		173 (5)
XI. PROBABILITY AND STATISTICS							
1. Draw and interpret.							
Tables							
Bar graphs				86 (5)			
Line graphs					120 (10) /DT(5)		
2. Collect data							
3. Make predictions.							

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	1 1-19	2 20-31	3 32-63	4 64-87	5 88-123	6 124-151	152-185
XII. NUMBER THEORY							
1. Recognize special properties of numbers.							
Factors and factor trees							
Common factors							
Prime numbers							
Perfect numbers							
Multiples							
Even-odd numbers							
CHAPTER REVIEWS	18(10)	30(10)	61(10)	85(10)	121(10)	148(10)	182(10)
CUMULATIVE TEST				DT(10)			DT(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4: CHAPTERS 8-13

CHAPTER PAGES	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
I. STRUCTURE						
1. Recognize and use basic principles for operations.						
Additive identity-zero						
Multiplying by one law (identity)						
Multiplying by zero law						
Zero as a dividend	188(9)					
Distributive law of multiplication						
Associative (grouping) law for addition						
Commutative law for addition						
Associative (grouping) law for multiplication						
Commutative law for multiplication						
2. Use operation facts on whole numbers to complete square matrix boxes illustrating basic principles.						
Addition boxes						
Subtraction boxes						
Multiplication boxes	216(3)					
3. Complete square matrix addition boxes which illustrate basic principles using fractions and mixed numerals.				258-261(9)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
II. SETS						
1. Interpret illustrations of operations with sets. Addition (joining) Subtraction (separating) Multiplication Division						
2. Use sets and regions to represent fractional numbers. Sets Regions						
III. NUMERATION						
1. Identify place values represented by grouped objects with words (<u>tens</u> and <u>ones</u>), tables (<u>tens/ones</u>), and standard numerals. To hundreds place To thousands place To hundred thousands place To millions place						
2. Relate Hindu-Arabic and Roman numerals through XXXIX by rewriting. Roman to Hindu-Arabic Hindu-Arabic to Roman						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
3. Relate decimal system measures by rewriting expressions in different units. Money (dollars and cents) Metric system (kilometers, meters and centimeters)						
IV. NUMBER						
1. Represent the order of numbers by writing numerals on the number line. Tens and hundreds Fractions Mixed numerals				253-254 (10)		
2. Recognize special properties of numbers. Even and odd numbers Multiples Factors and common factors Prime numbers Perfect numbers	(See XII-1) (See XII-1) (See XII-1) (See XII-1) (See XII-1)					
3. Identify relationships between fractional numbers. Numerator - denominator Comparing fractions Equivalent fractions Reducing fractions Rewriting fractions as mixed numerals Rewriting mixed numerals as fractions		232-233 (10) /DT (5)		260-261 (10) /55 (7) /DT (8) 253-255 (10) 258 /54 (7) /DT (8)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4CHAPTER
PAGES

CHAPTER PAGES	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
V. NUMBER SENTENCES						
1. Complete number sentences using symbols $<$, $>$, $=$.						
2. Write related number sentences.						
Addition, subtraction						
Multiplication, division	186(6)					
Fraction, division						
Multiplication, addition	189-190(10) /DT(3)					
3. Use letters and frames as variables in number sentences.	(Letters and frames are used as variables throughout the text).					
4. Write number sentences to solve problems.	(See also X) 215(10)					
5. Write number sentences involving units of measure.	(See X-2)					
6. Write number sentences from number-line pictures.						
7. Recognize the use of parentheses to show grouping.						
8. Graph addition and multiplication sentences.						
VI. ADDITION AND SUBTRACTION						
1. Recognize illustrations of addition and subtraction operations with sets.	(See II-1)					
2. Recognize illustrations of addition and subtraction operations on the number line.						
Whole numbers						
Fractional numbers						
3. Recognize the inverse relationships between the operations of addition and subtraction.						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	8 186-221	9 222-237	10 238-251	11 252-267 267(6)	12 268-283	13 284-294
4. Relate a slide rule model to the operations of addition and subtraction.						
5. Review basic addition and subtraction facts for whole numbers through sums to 18.						
6. Estimate sums and differences of whole numbers.			239-240(10) /DT(10)			
7. Use algorithms to add whole numbers. Vertical and standard form --2, 3 and 4 digit numerals with no regrouping --2, 3, 4 and n digit numerals with regrouping Three or more addends Doubling Computer function model Equation form						
8. Use algorithms to subtract whole numbers. Vertical and standard form --2 and 3 digit minuends with no regrouping --3, 4 and n digit minuends with regrouping Computer function model Equation form						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4CHAPTER
PAGES

	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
9. Use algorithms to add and subtract rational numbers.						
Fractions						
--Like denominators						
--Unlike denominators				256(10)		
Mixed numerals						
--Like denominators				$\frac{263(10)/56-57}{(10)/DT(8)}$		
---Unlike denominators				$\frac{264(10)/58(5)}{58(5)}$		
VII. MULTIPLICATION AND DIVISION						
1. Illustrate the multiplication and division operations with sets.	(See II-1)					
2. Illustrate operations on the number line.						
Multiplication						
Division						
Multiplication-addition						
3. Relate multiplication to repeated addition.						
4. Relate division to repeated subtraction.						
5. Recognize inverse relationship between multiplication and division.						
6. Review basic multiplication and division facts through 9 x 9.	193(10)					

D.C. HEATH INSTRUCTIONAL OUTCOMES

-78-

CHAPTER
PAGES

LEVEL 4

7. Multiply by special factors.	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
100						
20, 30						
8. Estimate products and quotients of whole numbers.						
Products			242-243(10) /DT(5) 246-247(10) /DT(3)			
Quotients						
9. Use algorithms to multiply whole numbers.						
Multiplication records						
--Tens and ones with no regrouping						
--Tens and ones with regrouping						
--Hundreds, tens and ones with no regrouping						
--Hundreds, tens and ones with regrouping						
Standard form						
--2 digit with no regrouping						
ing						
--2 digit with regrouping						
--3 digit with no regrouping						
ing						
--3 digit with regrouping						
Equations						
--Multiplication						
--Multiplication - addition						
189-190(10) /DT(3)						
Multiplying machine model						

D.C. HEATH INSTRUCTIONAL OUTCOMES LEVEL 4

CHAPTER	8	9	10	11	12	13
PAGES	186-221	222-237	238-251	252-267	268-283	284-294
10. Use algorithms to divide whole numbers. Missing factor Using multiplication facts to aid in division Division records --Tens and ones with no regrouping --Tens and ones with regrouping --Hundreds, tens and ones with no regrouping --Hundreds, tens and ones with regrouping Standard (long division) form --1 digit divisors --2 digit divisors --With remainders (introduction) --Checking (introduction) Equations Division machine model 11. Relate division to fractional part of a quantity.	193(6) 199(10)/DT(2)/44(5) 202-204(10)/DT(2)/45-46(8) 199(9)/DT(1) 207-210(10)/47-48(8)/DT(2) 186, 213(10)/DT(10) 191, 194-195(10)/42-43(10)/DT(10) 195, 216(10) 186(6)		245(16)			285-286(10) 288-289/DT(10) 284(10) /DT(5) 285-291(10) /59-60(8)
VIII. GEOMETRY 1. Recognize and identify basic geometric concepts relationships and figures. Line segment End points Lines Rays					271(2)/DT(3) 269, 271(7) /DT(1) 268, 271(10) /DT(3)	

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

-80-

CHAPTER PAGES	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
Planes						
Simple closed curves						
Polygons						
--Triangle						
--Quadrilateral						
--Squares						
--Trapazoid						
--Kite						
--Pentagon						
--Hexagon						
--Octagon						
--Diagonals						
Congruent figures						
Corresponding parts						
Fitting						
Line of symmetry						
Turns						
Tracing						
Angles						
--Sides					272-274(5)	
--Vertex					/DT(2)	
Congruent angles					272(1)	
					272(2)	
					273, 275(7)	
					/DT(3)	
Right angles					278(6)/DT(2)	
Perpendicular lines					276(6)/DT(2)	
Parallel lines					277(6)/DT(3)	
Circle						
--Radius					279(5)/DT(1)	
--Diameter					279(3)/DT(1)	
--Center					279(2)/DT(1)	
2. Make a scale drawing.						
IX. MEASUREMENT						
1. Measure line segments						
to the nearest specified						
unit.						
Nearest unit						
Nearest $\frac{1}{2}$ inch						
Nearest $\frac{1}{8}$ inch						
Nearest centimeter						
Nearest decimeter						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER

PAGES

8

186-221

9

222-237

10

238-251

11

252-267

12

268-283

13

284-294

- | | | | | | |
|--|--|--|--|--|--|
| 2. Measure perimeter of polygons. | | | | | |
| 3. Measure radius, diameter and circumference of circles. | | | | | |
| 4. Measure the area covered by irregular figures by counting. | | | | | |
| 5. Measure the volume of regular and irregular solids by counting. | | | | | |
| 6. Define and convert various units of measure. | | | | | |
| 7. Estimate surface area of rectangular solids by counting square units. | | | | | |
| 8. Recognize and use measures for, | | | | | |
| Time | | | | | |
| Weight in pounds | | | | | |
| Liquid measure | | | | | |

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 4

-82-

CHAPTER	PAGES	8	9	10	11	12	13
		186-221	222-237	238-251	252-267	268-283	284-294
X. PROBLEM SOLVING							
1. Solve word problems involving.							
Addition and subtraction							
Multiplication and division							
Fractions and mixed numerals							
Estimation							
2. Solve word problems involving.							
Money							
Weight							
Time							
Linear measure							
3. Write headlines for stories and stories for headlines.							
4. Write equations on a computer card model to solve word problems.							
XI. PROBABILITY AND STATISTICS							
1. Draw and interpret. Table							
Bar graphs							
Line graphs							
Collect data.							
3. Make predictions.							

287(8)

265(8)/DT(2)

241, 243, 244(10)
/DT(4)

196(5)

(See IX-1,6)

187(1)

287(1)

234(5)

292(8)

MATH
D.C. HEATH, INSTRUCTIONAL OUTCOMES
LEVEL 4

CHAPTER PAGES	8 186-221	9 222-237	10 238-251	11 252-267	12 268-283	13 284-294
XII. NUMBER THEORY						
1. Recognize special properties of numbers.						
Factors and factor trees		226, 229, 236(10) /DT(10)				
Common factors		231(10) /51-52(8)/DT(5) 228(7)/DT(10)				
Prime numbers		236(2)				
Perfect numbers		222(10)				
Multiples		/49-50(8) /DT(10)				
Even-odd numbers		223-224(10) /DT(6)				
CHAPTER REVIEWS	219(10)	235(10)	249(10)	266(10)	281(10)	294(10)
CUMULATIVE TEST						DT(10)

D.C. HEALTH INSTRUCTIONAL OUTCOMES
LEVEL 5: CHAPTERS 1-7

-84-

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
I. STRUCTURE							
1. Recognize the laws of mathematical operations.							
The order law (commutativity)		32-3(10) /7(8)/DT(1)					
--For addition		32-3(1) /DT(1)					
--For multiplication		32-3(10) /DT(1)					
The grouping law (associativity)							
--For addition		32-3(10) /DT(1)					
--For multiplication		32-3(1)/DT(1) 32-3(1)/DT(1)			98-9(10) /20(4)		
The multiplying by 1 law		32-3(1)/DT(1)					
The multiplying by 0 law							
Properties of 1 in multiplication and division of fractions							
Reciprocals							
2. Complete operation boxes.							
Addition boxes				61-2(10) 69(6)			
Addition-subtraction boxes							
Multiplication boxes					88 101(9)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
I. SETS							
1. Recognize sets from description or roster. Brace notation Members of a set Subsets							
2. Describe the intersection of sets (\cap).							
3. Identify different sets of numbers. Sets of factors Sets of multiples Recognize special sets. Empty sets Infinite sets							
4. Relate sets and regions to fractional numbers. Relate sets and regions to operations. Multiplication					80-1(10) <u>/16-21(10)</u>		139(3) <u>/26-8(10)</u>
Division							
III. NUMBER AND NUMERATION							
1. Represent numbers on an abacus.	1(3)						
2. Read and write numerals. To thousands To hundred thousands To millions To billions	1-2(10)/1-2 (10)/DT(3) 2(4)/DT(1) 4-5(10)/DT(4) 6(10)/DT(5)						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

-86-

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
3. State the place value of a digit.							
4. Represent numerals in different forms.							
5. Recognize fractional numbers in common form.							
6. Recognize fractional numbers in decimal form.							
8. Convert decimal numerals to Roman numerals to Base-5 numerals							

1-7(10)

1-2(8)
1-6(10)/1-2
(10)/DT(6)

9(10)/DT(10)
10-14(10)

3. State the place value of a digit.

In a whole number
In a decimal fraction
Represent numerals in different forms.
Expanded form
Standard form

Exponential form
5. Recognize fractional numbers in common form.
Numerator/Denominator
Equivalent fractions
Mixed numerals
Improper fractions
6. Recognize fractional numbers in decimal form.

Decimal point
Tenths
Hundredths
Relate fractional numbers in common form to

Regions
Whole numbers
Mixed numerals
Fractions in decimal form

8. Convert decimal numerals to Roman numerals to Base-5 numerals

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5CHAPTER
PAGES9. Use the number line
to represent

- Fractional numbers
- Decimal numbers
- Mixed numerals
- Multiples
- Mathematical operations
- Addition
- Subtraction

10. Graph a set of number
pairs on a number plane.

IV. NUMBER SENTENCES

1. Identify relational
symbols $<$, $>$, $=$.
2. Use parentheses to
show grouping.
3. Use relational symbols
to compare numbers.
- Whole numbers

4. Fractional numbers
Identify true, false,
and open sentences.5. Identify related oper-
ation sets in verbal senten-
ces.

- Addition-subtraction
of whole numbers
- Multiplication-division
of whole numbers
- Multiplication-division
of fractional numbers

1

1-15

2

16-37

3

38-57

4

58-79

5

80-111

6

112-137

7

138-175

34-5(10)

 $8(10)/2(4)$
/DT(9)

32-3(10)

 $8(10)/2(4)$
/DT(9)24-5, 28(10)
/DT(3)
24-5, 28(10)
/DT(3)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

88

CHAPTER

PAGES

1

1-15

2

16-37

3

38-57

4

58-79

5

80-111

6

112-137

7

138-175

6. Translate verbal sentences to number sentences and expressions.

7. Write and solve number sentences involving whole numbers

Fractional numbers
Areas and volumes

8. Identify the order of operations in solving multiplication-addition equations.

V. ADDITION AND SUBTRACTION

1. Recall basic facts.

2. Add-subtract with whole numbers.

Addition with 2, 3, 4-

digit numbers

--Standard form

--With regrouping

--Expanded form

--Equation form

--Table form

--With regrouping

--More than two addends

Subtraction with 2, 3-digit numbers

--Equation form

--Standard form

--With regrouping

26(10)/DT(6)

80-1(10)

20(10)3-4(10)
/DT(7)58-62(10)
59-62(10)
/DT(3)/10(9)
/10-11(10)
63(10)/13(9)
/DT(1)68-9,73(10)
/14-15(10)
/DT(4)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
3. Add-subtract with fractional numbers. Fractional numbers less than 1 --Like denominators --Unlike denominators Mixed numerals --Like denominators --With regrouping --Unlike denominators --With regrouping 4. Add-subtract with decimal fractions. Addition --Table form --Standard form Subtraction --Table form --Standard form 5. Add-subtract with 4, 6-clock numerals. 6. Estimate sums and differences.							
VI. MULTIPLICATION AND DIVISION 1. Recall basic facts.		21-2, 31(10) /5-6(10) /DT(10)	55(10)	72(10)	16(8)		
2. Multiply-divide with whole numbers. Multiplication with 2, 3-digit and 1-digit factors							

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 5

-90-

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
--Table form					81-3(10) <u>/17(6)/DT(4)</u> 83(10)/18(6) <u>/DT(4)</u> 84-5,88(10) <u>/DT(5)</u>		
--With regrouping							
--Standard form							
Multiplication with 2, 3-digit and 10 or 100 as factors							
--Table form							
--Standard form					89(3) 89-90(10) <u>/DT(5)</u> 91(10)		
--Shortcut form							
Multiplication with 2, 3-digit and multiples of 10 as factors					92-3,95 103, 103(10)/19 <u>(4)/DT(5)</u> 96,106(10)		
--Standard form							
--Shortcut form					101,107,109 <u>(10)/DT(5)</u> 100 106(10) <u>/21(3)</u> 98-99(10) <u>/20(4)</u>		
--Using the distributive law							
Division with 2, 3-digit dividends and 1-digit divisions							
--Standard form							139-140 146,155 <u>/26-7(10)</u> <u>/DT(10)</u>

D.G. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
--Table form							144-5/28-9 (10) 149-53/30-1 (10)/DT(8) 154, 168(10)
--With regrouping							
--Shortcut form							
--Long form							
Division with 3, 4- digit dividends and 2-digit divisors							
--Standard form							169-70, 172 (10)/DT(4) 164-5(10)
--Using multiplication facts							32-33(8) 156(10)/29(2) /DT(2)
--Table form							
Division with numerals involving zero							
3. Multiply-divide with fractional numbers.							
Multiplication with fractional numbers							
--One factor a whole number							
--Both factors fractions							
Division with fractional numbers							
--One factor a whole number							
--Both factors fractions							
4. Estimate products and quotients.					103, 109(10)		157, 167(10)
VII. GEOMETRY							
1. Identify basic-figures.							
Points							
--End point							
Rays							
Segments							
--Parallel							
--Midpoint							

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 5

-92-

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
2. Perform measurements.							
Linear							
--Line segments							
--Perimeters							
--Geographic distance							
Estimate widths				76(10) 65(8)	97(4)	112, 114, 116 (10)/22-3(10) /DT(5) 113, 128(10)	
Area							
--Regions							
--Unit count							
--Rectangle							
--Formula							
--Square							
--Formula						/24(6) 118-9, 128-9 (10)/DT(1)	
--Parallelogram							
--Unit count							
--Formula							
--Triangle						120-1, 128-9 (10)/DT(1)	
--Formula						122(2) 122(6)/DT(1)	
Volume						123(6)/DT(1)	
--Rectangular cube							
--Unit count							
--Formula						124(7)/25(6) 126(6)/DT(1)	
--Cube							
--Formula						127(5)/DT(1)	
Angle						131-3(10) /DT(2)	
Force and pressure							171(8)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER, PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
VIII. MEASUREMENT							
1. Identify and interrelate units of measurement.							
Length							
--Metric system							
--Millimeter							
--Centimeter							
--Decimeter							
--Meter							
--Kilometer							
--English System							
--Inch							
--Foot							
--Yard							
--Mile							
Area							
--Square centimeter							
--Square inch							
--Square foot							
--Square yard							
Volume							
--Cubic centimeter							
--Cubic inch							
Angle							
--Degree							
--Unit angle							
Time							
--Decade							
--Century							
Temperature							
--Degree							

37(1)

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 5

-94-

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
Lines			38(5)/DT(1) 47, 57(8)/DT(1) 57(1)				
--Perpendicular bisector			54(6)/DT(1) 39(4)/DT(1) 39(0) 39(0) 47(0)/DT(1) 40-1, 54(4) 38(5)				
--Parallel Angles							
--Sides							
--Vertex							
--Right							
--Bisector							
--Congruent Plane							
2. Recognize geometric shapes.							
Triangles							
--Isosceles							
--Base							
--Equilateral							
--Scalene							
Quadrilaterals							
Polygon							
Rectangle							
Square							
Trapezoid							
Parallelogram							
Circle							
--Circumference							
--Diagrams							
--Arc							
Hexagon							
Octagon							
--Perimeter							
Regular figure							
Recognize closed surfaces.							
Cube							
--Edge							
Rectangular solid							
Tetrahedron							
Hexahedron							

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
4. Match geometric figures. Congruency --Fittings --Face-up --Face-down --On itself --Corresponding parts --Tracing Symmetry --Line of symmetry --Turns --Center --Tracing Construct geometric figures. Segments Triangles Circles Parallel lines ^t Scale drawing Perpendicular bisector. Regular hexagon Angle bisector Octagon Hexagon Curve stitching Eclipse 6. Use devices for geo- metric constructions. Straight edge Compass Protractor			40-3(10)/8(6) /DT(2) 41-3(5)/DT(2) 40(2)/DT(1) 42(1) 44, 52-3(10) 44, 52-3(10) 41, 44, 52-3(10) /DT(3) 45-6, 48-9(10) /DT(3) 52-3(10)/DT(1) 52-3(10)/DT(1) 44-5(10)				
5.			51(1) 51(3)/DT(2) 57(1)	78(1)		116(10)	
6.				77(8) 78(1)			175(6)
			51, 57(8) 51, 57(8)			132-3(10) /DT(2)	

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	1 1-15	2 16-37	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
3. Solve problems related to Motion Rates Ratios Averages							160-1,170 (10)
XI. PROBABILITY AND STATISTICS 1. Draw and/or interpret graphs. Sum graphs Line graphs Pictograms Factor graphs							142(5)
2. Predict the probability of events.							
3. Calculate the average of a set of numbers.							160-1,170 (10)
XII. NUMBER THEORY 1. Recognize special sets of numbers. Even and odd numbers Square numbers Prime numbers Factors of a number --Common factors --Greatest common factor --Factor trees --Factor graphs Multiples of a number --Common multiples Exponents Number pairs Number sequences Ratios		18,34-5(10) /DT(10)					

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

-98-

CHAPTER PAGES	1 1-15	2 16-37 30(10)	3 38-57	4 58-79	5 80-111	6 112-137	7 138-175
2. . . Reduce numerical expressions to lower and lowest terms.							
CHAPTER REVIEWS	14(10)	36(10)	56(10)	77(10)	110(10)	135(10)	174(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5: CHAPTERS 8-13

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
I. STRUCTURE						
1. Recognize the laws of mathematical operations. The order law (commutativity) --For addition --For multiplication The grouping law. (associativity) --For addition --For multiplication The adding 0 law The distributive law for multiplication The multiplying by 1 law The multiplying by 0 law Properties of 1 in multiplication and division of fractions Reciprocals Complete operation boxes. Addition boxes Addition-subtraction boxes Multiplication boxes						
		217(3)	233, 238(9)			289(8) 290(8)
2.						287(3)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5CHAPTER
PAGES

8

176-195

9

196-223

10

224-245

11

246-261

12

262-283

13

284-294

II. SETS

1. Recognize sets from description or roster.
Brace notation
Members of a set
Subsets

2. Describe the intersection of sets (n).
3. Identify different sets of numbers.

Sets of factors

Sets of multiples

4. Recognize special sets.
Empty sets
Infinite sets
Relate sets and regions to fractional numbers.

6. Relate sets and regions to operations.

Multiplication

Division

III. NUMBER AND NUMERATION

1. Represent numbers on an abacus.

2. Read and write numerals.

To thousands

To hundred thousands

To millions

To billions

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5CHAPTER
PAGES

8

176-195

9

196-223

10

224-245

11

246-261

12

262-283

13

284-294

3. State the place value of a digit.

In a whole number

In a decimal fraction

4. Represent numerals in different forms.

Expanded form

Standard form

Exponential form

5. Recognize fractional numbers in common form.

Numerator/Denominator

Equivalent fractions

Mixed numerals

Improper fractions

6. Recognize fractional numbers in decimal form.

Decimal point

Tenths

Hundredths

7. Relate fractional numbers in common form to Regions

Whole numbers

Mixed numbers

Fractions in decimal form

8. Convert decimal numerals to

Roman numerals to M

Base-5 numerals

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

-102-

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
9. Use the number line to represent Fractional numbers Decimal numbers Mixed numerals Multiples Mathematical-operations --Addition --Subtraction 10. Graph a set of number pairs on a number plane.	186(2)	208(10) 213(7) 213(7)	224, 226(10)		270(10)	
IV. NUMBER SENTENCES 1. Identify relational symbols $<$, $>$, $=$. 2. Use parentheses to show grouping. 3. Use relational symbols to compare numbers. Whole numbers Fractional numbers Identify true, false, and open sentences. 5. Identify related operation sets in verbal sentences.				56(6)		
Addition-subtraction of whole numbers Multiplication-division of whole numbers Multiplication-division of fractional numbers		198-9(10)				

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER
PAGES

8	9	10	11	12	13
176-195	196-223	224-245	246-261	262-283	284-294
6. Translate verbal sentences to number sentences and expressions.					
7. Write and solve number sentences involving Whole numbers					
Fractional numbers	199(6)/41-5(10) /DT(9) 199(3)				
Areas and volumes					
8. Identify the order of operations in solving multiplication-addition equations.					284-5(10) /DT(1)
V. ADDITION AND SUBTRACTION					
1. Recall basic facts.					
2. Add-subtract with whole numbers.					
Addition with 2, 3, 4-digit numbers					
--Standard form					
--With regrouping					
--Expanded form					
--Table form					
--With regrouping					
--More than two addends					
Subtraction with 2, 3-digit numbers					
--Equation form					
--Standard form					
--With regrouping					

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

-104-

CHAPTER	8	9	10	11	12	13
PAGES	176-195	196-223	224-245	246-261	262-283	284-294
3. Add-subtract with fractional numbers. Fractional numbers less than 1 --Like denominators --Unlike denominators Mixed numerals --Like denominators --With regrouping --Unlike denominators --With regrouping		$\frac{213(10)}{(10)} / \frac{41-2}{DT(4)}$ $\frac{214-21(10)}{43-46(10)}$ $/DT(5)$	$\frac{237(10)}{238(10)} / DT(5)$ $\frac{(10)}{(10)} / DT(5)$ $\frac{239(10)}{241(10)} / \frac{51-2}{DT(2)}$			
4. Add-subtract with decimal fractions. Addition --Table form --Standard form Subtraction --Table form --Standard form					$\frac{57(6)}{272(10)} / DT(3)$ $\frac{273(10)}{DT(3)} / \frac{58(6)}{DT(3)}$	
5. Add-subtract with 4, 6-clock numerals. 6. Estimate sums and differences.	190-1(10)					
VI. MULTIPLICATION AND DIVISION 1. Recall basic facts. 2. Multiply-divide with whole numbers. Multiplication with 2, 3-digit and 1-digit factors						

106

D.C.. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
--Table form						
--With regrouping						
--Standard form						
Multiplication with						
2, 3-digit and 10 or						
100 as factors						
--Table form						
--Standard form						
--Shortcut form						
Multiplication with						
2, 3-digit and multiples						
of 10 as factors						
--Standard form						
--Shortcut form						
Multiplication with						
2, 3-digit factors						
--Standard form						
--Shortcut form						
--Using the distributive						
law						
Division with 2, 3-digit						
dividends and 1-digit						
divisions						
--Standard form						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

-106-

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
--Table form --With regrouping --Shortcut form --Long form Division with 3, 4- digit dividends and 2-digit divisors --Standard form --Using multiplication facts --Table form Division with numerals involving zero 3. Multiply-divide with fractional numbers. Multiplication with fractional numbers --One factor a whole number --Both factors fractions						
Division with fractional numbers --One factor a whole number --Both factors fractions		201-3(10)/39(8) /DT(8)				287(10) /DT(1) 286-7(10) /59(10) /DT(5) 290-3(10) /60(6)/DT(4) 290-3(10) /DT(4)
4. Estimate products and quotients.						
VII. GEOMETRY 1. Identify basic figures. Points --End point Rays Segments --Parallel --Midpoint						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
Lines						
--Perpendicular			245(1)		278(2)	
--Perpendicular bisector					278(2)	
Parallel						
Angles						
--Sides						
--Vertex						
--Right			245(1)			
--Bisector						
--Congruent						
Plane						
2. Recognize geometric shapes.					277(10)/DT(2) 277(10)/DT(2) 277(10)/DT(2)	
Triangles						
--Isosceles						
--Base						
--Equilateral						
--Scalene						
Quadrilaterals						
Polygon						
Rectangle						
Square						
Trapezoid						
Parallelogram						
Circle						
--Circumference						
--Diagrams						
--Arc						
Hexagon						
Octagon						
--Perimeter						
Regular figure			245(1)			
Recognize closed surfaces.					281(1)/283(1)	
Cube						
--Edge						
Rectangular solid						
Tetrahedron						
Hexahedron					283(3) 283(3)	

CHAPTER	8	9	10	11	12	13
PAGES	176-195	196-223	224-245	246-261	262-283	284-294
4. Match geometric figures. Congruency, --Fittings --Face-up --Face-down --On itself --Corresponding parts --Tracing Symmetry --Line of symmetry --Turns --Center --Tracing					276(9)/DT(1)	
5. Construct geometric figures. Segments Triangles Circles Parallel lines Scale drawing Perpendicular bisector Regular hexagon Angle bisector Octagon Hexagon Curve stitching Eclipse		223(1) 223(1) 223(1)	243(6) 245(1) 245(1)	253(6)	278-9,281(10) /DT(3)	
6. Use devices for geometric constructions. Straight edge Compass Protractor						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
2. Perform measurements.						
Linear						
--Line segments						
--Perimeters						
--Geographic distance						
Estimate widths						
Area						
--Regions						
--Unit count						
--Rectangle						
--Formula						
--Square						
--Formula						
--Parallelogram						
--Unit count						
--Formula						
--Triangle						
--Formula						
Volume						
--Rectangular cube						
--Unit count						
--Formula						
--Cube						
--Formula						
Angle						
Force and pressure						

CHAPTER
PAGES

8
176-195

9
196-223

10
224-245

11
246-261

12
262-283

13
284-294

VIII. MEASUREMENT

1. Identify and interrelate units of measurement.

Length

--Metric system

--Millimeter

--Centimeter

--Decimeter

--Meter

--Kilometer

--English system

--Inch

--Foot

--Yard

--Mile

Area

--Square centimeter

--Square inch

--Square foot

--Square yard

Volume

--Cubic centimeter

--Cubic inch

Angle

--Degree

--Unit angle

Time

--Decade

--Century

Temperature

--Degree

267(10)
271(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
IX. FUNCTIONS						
1. Recognize function rules involving mathematical operations.						
Addition						
Subtraction						
Multiplication						
Division						
2. Draw graphs on number planes.						
For number pairs		214(3)				
For function rules						
X. PROBLEM SOLVING						
1. Write headlines for stories (vice versa)				255(8)		
2. Solve problems using mathematical operations.						
Addition and subtraction						
--Whole numbers	185(6)					
--Fractions		220(8)	242(8)		274-5(6)	
--Decimals						
Multiplication and division	193(10)					
Fractions		200, 207, 212 (10)	232, 235(6)			293(3)/DT(2)

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 5

-112-

CHAPTER PAGES	8 176-195	9 196-223	10 224-245	11 246-261	12 262-283	13 284-294
3. Solve problems related to Motion Rates Ratios				250-2(10) 250-2(10)/DT(4) 246-8(10)		
XI. PROBABILITY AND STATISTICS 1. Draw and/or interpret graphs. Sum graphs Line graphs Pictograms Factor graphs	181(6)	214(4)		258(10)/DT(4)		
3. Predict the probability of events.				256-7, 260(10)		
XII. NUMBER THEORY 1. Recognize special sets of numbers. Even and odd numbers Square numbers Prime numbers	189, 195(10) 189(10) 178-9(10) /DT(10)					
Factors of a number	176(10)/34(10) /DT(6)					
--Common factors	184(10)/DT(4)					
--Greatest common factor	184(2)					
--Factor trees	180(10)					
Factor graphs	181(6)					
Multiples of a number	186-7(10)/35 (10)/DT(4)					
--Common multiples	187(10)/DT(4)					
Exponents	188(10)/DT(10)					
Number pairs						
Number sequences						
Ratios				249(10) 246-8(10)/53 (10)/DT(10)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 5

CHAPTER

PAGES

2. Reduce numerical expressions to lower and lowest terms.

8

176-195

9

196-223

10

224-245

11

246-261

12

262-283

13

284-294

206(10)/DT(10)

CHAPTER REVIEWS

194(10)

222(10)

244(10)

259

282

294

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6: CHAPTERS 1-6

-114-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
I. STRUCTURE						
1. Recognize the laws of mathematical operations.						
The order law (commutativity)						
--For addition			59(1)			
--For multiplication			59(3)			
The grouping law (associativity)						
--For addition			59(1)			
--For multiplication			59,66-7(3) /15(4)			
The distributive law of multiplication over addition			68,72(0) /16(4)			
The adding 0 law (additive identity)			59(1)			
The multiplying by 1 law (multiplicative identity)			59(2)			
The multiplying by 0 law			59(1)			
Properties of 1 in multiplication and division of fractions						
Reciprocals						
Opposites						
Zero as a quotient						
Order of operations						
Complete operation boxes.						
Addition boxes						
Multiplication boxes		49(6)	69(3)		132(3)	
II. SETS						
1. Recognize sets from description or roster.						
Symbols						
--Brace notation		34-5(10) /DT(3)				

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
1. Members of a set		34(1)/DT(3) 36(0)/DT(1) 35(1)/DT(1) 34-5(10) /DT(3)				
2. Subsets Identify special sets. Empty sets Finite and infinite sets		34(7)/DT(3) 34, 36(1)				
3. Recognize set operations. Union (U) Intersection (\cap) Pairing members of sets Relate sets, regions or blocks to numbers.		35(10)/DT(1) 36(6)/DT(2) 37(6)				
4. Whole numbers Fractions in common form Fractions in decimal form	1(4) 2-9(10)/1-4 (10)/DT(4)				116, 123(10) /24-5(10)	
5. Relate sets and regions to operations. Addition-subtraction Multiplication-division		48, 50(0) /5, 10-11(10) 6-7(10)	58-9(10)/12-19 (10)			
III. NUMBER AND NUMERATION 1. Read and write numerals. For whole numbers --To thousands --To millions --To billions --To trillions	1, 16-7(4) 16-7(8) 16-7(5)/DT(1) 16-7(2)/DT(3)					

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-116-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
For decimal fractions						
--To tenths	2-6(10)/1(8) /DT(6)					
--To hundredths	7-12(10)/3(8) /DT(10)					
--To thousandths	13(10)/DT(5)					
2. State the place value of a digit.	1, 17(10) 7, 13(10)/1, 3 (10)					
3. Represent numbers in different forms.						
Table form	3, 7(10)/1, 3 (10)					
Standard form	1-3, 13, 16-7 (10)/DT(10)					
Exponential form						
Rounding numbers.						
Whole numbers						
Decimal fractions						
5. Recognize concepts related to a set of number pairs.		32-3(10)/DT(2) 32-3(7)/DT(4) 33(4)				
Function rule						
Completion of the set						
Graphing the set on a number plane						
6. Recognize fractional numbers.						
Fractional numbers in common form						116-7(10)/24-5 (10)
Equivalent fractions in common form						121, 123-7(10) /27(8)/DT(3)
Mixed numerals in common form						134(10)/DT(3)
Fractions in percent form						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
Fractional numbers in decimal form	3-13(10)					
--Decimal point	3-13(10)					
--Terminating and nonterminating			88(10)			
7. Count using nonstandard bases.						
Base 6	22-23(7)					
Base 5	23(7)					
Base 2	23(7)					
8. Convert a numeral to another form (vice versa).						
Fractions in common form to fractions in decimal form	10(10)					
Fractions in common form to fractions in percent form						
Fractions in common form to fractions in mixed form						
Decimals to percent						
Base 10 numerals to fractions in other bases						
--Base 6	20-1(10)					
--Base 2	23(7)					
--Base 5	23(7)					
Whole numbers in exponential form to standard form						
9. Identify positive and negative integers.						
10. Use the number line to represent numbers and operations.						
--Fractional numbers						
					127,134(10) /DT(3)	

135-6(10)/32-3
(10)/DT(7)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-118-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
--Integers --Multiples Operations --Addition-subtraction --Multiplication-division			58(2)		130(6)	
IV. NUMBER SENTENCES						
1. Identify relational symbols <, >, =, ≠, ~.	14(10)/2, 4(10) /DT(8)					
2. Translate verbal sentences to number sentences and expressions.		30, 42-3(10)				
3. Recognize open, false and true sentences.						
4. Solve number sentences involving Whole numbers Fractional numbers		30(10) 48-51(10) /10-1(10) /DT(6)	59(10)		117-20, 130-1 (10)/29-31(8) /DT(10)	
Proportions Two-step equations Inequalities	14(10)/2, 4 (10)/DT(8)				128-9(10)/DT(6)	
5. Solve mathematical expressions.						
6. Use parentheses to show grouping.			59(10)			
7. Identify the order of operation in solving equations.	(See I-1)					
8. Identify related operations in verbal sentences.						
Addition-subtraction		28-30(10), /DT(2)				
Multiplication-division		28-30(10) /DT(2)				

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER
PAGES

1

2

3

4

5

6

146-167

116-145

94-115

58-93

28-57

1-27

V. ADDITION AND SUBTRACTION

1. Recall basic facts.

$\frac{1}{5}(9)$
 $\frac{1}{1}(0)$

2. Add-subtract with whole numbers.

3. Add-subtract with fractional numbers.

Fractional numbers less than 1

--Like denominators

$\frac{130(10)}{(10)}/\frac{28-9}{DT(2)}$

--Unlike denominators

$\frac{131(10)}{(10)}/\frac{30-1}{DT(4)}$

--Shortcut form

Fractional numbers more than 1

--With regrouping

$\frac{132(10)}{(10)}/\frac{34-5}{DT(4)}$

$\frac{140(10)}{(10)}/\frac{36-7}{DT(4)}$

4. Add-subtract with decimal fractions.

Standard form

--With regrouping

48, 50(10)

$\frac{51-2(10)}{(10)}/\frac{10-11}{DT(4)}$

$\frac{49(10)}{(10)}/\frac{DT(2)}{DT(2)}$

49(6)

Equation form

Shortcut form

5. Add-subtract with integers.

6. Add-subtract with numerals in different bases.

Base 5

Base 6

Base 2

23(0)

22(10)

23(0)

7. Estimate sums and differences.

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-120-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
VI. MULTIPLICATION AND DIVISION		31(10)/6-7(10)				
1. Recall basic facts.						
2. Multiply-divide with whole numbers.						
Multiplication with 2, 3-digit and 1-digit factors						
--Standard form			60(10)/12(6)			
--Without regrouping			61(10)/13(6)			
--With regrouping			/DT(1)			
Multiplication with 2, 3-digit and 10 or 100 as factors			63(10)			
--Equation form			63(5)/15(4)			
--Standard form			66-7(10)/16(4)			
Multiplication with 2, 3-digit and multiples of 10 as factors			/DT(2)			
--Using the grouping law			66-7(0)/15(4)			
--Using the distributive law			68(0)/16(4)			
Multiplication with 2, 3-digit factors						
--Standard form			68-9(10)/DT(2)			
Division with 3, 4-digit dividends and 1-digit divisors						
--Standard form			75(10)/17(6)			
--Without regrouping			/DT(1)			
--With regrouping			77(10)/18(4)			
Division with 3, 4-digit dividends and 2-digit divisors			/DT(1)			
--Standard form			78, 81(10)/DT(3)			

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6CHAPTER
PAGES1
1-272
28-573
58-934
94-1155
116-1456
146-167

Division with 4, 5-digit
dividends and 3-digit
divisors

--Standard form

3. Multiply-divide with
fractions in common form

Multiplication with

fractions less than 1

--One factor a whole

number

--One factor a percent

--Both factors fractions

Multiplication with

fractions greater than 1

--One factor a whole number

--Both factors mixed

numerals

Division with fractions

less than 1

--Dividends whole numbers

--Dividends and divisor

fractions

Division with fractions

greater than 1

--Dividends and divisors

whole numbers

4. Multiply-divide with

decimal fractions.

Multiplication

--One factor 1-digit

whole number

--One factor 10 or 100

--One factor a multiple

of 10

--One factor 2-digit

whole number

--One factor .1 or .01

81(6)

$$\frac{62(10)/14(6)}{DT(2)}$$

$$\frac{64(10)/DT(3)}{67(10)/DT(2)}$$

$$\frac{72(10)/DT(2)}{DT(2)}$$

D.C. HEALTH INSTRUCTIONAL OUTCOMES
LEVEL 6

-122-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 145-167
--Shortcut form						
--Both factors decimals						
--Shortcut form						
Division						
--Dividends and divisors whole numbers			83,88(10) 84-5,89(10) /19(6)/DT(5)			
--Divisors whole numbers						
--Divisors .1 or .01						
--Dividends and divisors decimals						
--Shortcut form						
5. Multiply-divide with numerals in different bases.	22-3(0) 22-3(0) 22-3(0)					
Base 6						
Base 5						
Base 2						
Estimate products and quotients.						
VII. GEOMETRY						
1. Identify basic figures.						
Points						/DT(1) 146(2) 151(1)
--End point						148(5) /DT(1) 151,159(4)
--Midpoint						/DT(1) 146(2)
Lines						/DT(2) 146(2) /DT(2)
--Perpendicular						
--Parallel						
--Perpendicular bisector						
Segments						
Rays						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
Angles						147(10) /DT(2) 147(2) 147(0) 167(4) 151(2) 147(0) 149(6)
--Sides						
--Right						
--Exterior						
--Angle bisector						
--Vertex						
--Congruent						
2. Recognize geometric shapes.						
Triangles						162-3(4) /DT(2) 162-3(7) /DT(2) 162-3(2) /DT(2)
--Equilateral						
--Isosceles						
--Scalene						
Square						
--Diagonal						
Rectangle						
Parallelogram						
Rhombus						
Circle						
--Radius						
--Diameter						
--Circumference						
Trapezoid						
--Isosceles						
Polygons						
--Regular						164(10)
--Perimeter						
--Angle						
--Exterior						167(9)
Quadrilaterals						

D. C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-124-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
3. Recognize closed surfaces. Cube --Face Rectangular solid Match geometric figures. Congruent figures				107(1)/DT(1) 108(10) 107-8(4)/DT(1)		149-50(10) <u>38(6)</u> /DT(1) 153,157(10) /39(6) 153(4)/39 (6)/DT(2) 156(6) 154-6(6) <u>40(5)</u> /DT(1) 158(9)/DT(4)
--Fittings (complete half-turns) --Face-down --Face-up --Self-congruence --Corresponding parts						
Symmetrical figures --Points of symmetry --Lines of symmetry --Planes of symmetry						
5. Draw a geometric figure to a given scale.						
6. Use a protractor to measure angles.				111(10)/DT(3)		
VIII. MEASUREMENT 1. Identify and interrelate units of measurement. Length --Metric system --Millimeter --Centimeter --Decimeter				98(7)/22(6) /DT(2) 98,100,103(10) <u>21(6)</u> /DT(4) 98(10)/DT(1)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
--Meter				98,100(10) /DT(4)		
--Decameter				98(0)		
--Hectometer				98(0)		
--Kilometer				98,100,103(2) /DT(1)		
--English system				96,99,100,103 (10)/DT(2)		
--Inch				96,99,103(10) /DT(4)		
--Foot				96,99,100,103 (10)/DT(4)		
--Yard				96,100,103(1) /DT(2)		
--Mile						
Area						
--Metric system						
--Square centimeter				103(6)/DT(1)		
--Square decimeter				103(2)		
--Square meter				103(2)		
--English system						
--Square inch				103(3)/DT(2)		
--Square foot				103(2)/DT(1)		
--Square yard				103(2)		
Volume						
--Metric system						
--Cubic centimeter				107(0)/DT(1)		
--Cubic decimeter				107(1)		
--English system						
--Cubic inch				107(2)/DT(1)		
--Cubic foot				107(3)		
Time						
--Years	25(2)/DT(4)					
--Decade	25(2)/DT(4)					
--Century	25(2)/DT(4)					
Angle						
--Degree				110-1(10) /DT(3)		

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 6

-126-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
2. Perform measurements. Linear --Length --Width --Height --Circumference --Meaning of Pi --Formula --Estimates --Perimeter Area --Unit count --Formula Volume --Unit count --Formula Angles --Sum of the angles of a triangle --Sum of the angles of a quadrilateral --Sum of the interior angles of a polygon --Sum of the exterior angles of a polygon				94(3)/21-2(10) /DT(2) 94(3) 94(3) 100(0) 101(10)/DT(5) 102-3, 108-9(10) /22(6) 104(4)/DT(5) 106(6)/23(6) 107(6)/DT(2) 111(10)/DT(3) 112(1) 112(1)		167(6)
IX. FUNCTIONS 1. Recognize function rules involving mathematical operations. Addition-subtraction Multiplication-division 2. Draw graphs on number planes. For number pairs For function rules		28-3(10)/DT(3) 28-3(10)/DT(3) 33(1) 33(5)				

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
X. PROBLEM SOLVING AND APPLICATIONS						
1. Write verbal problems about a set of given data.		38-9, 43(4)				
2. Solve problems using mathematical operations.						
Addition-subtraction						
---Whole numbers		43(2)				
---Fractions					143(2) 143(1)	
---Decimals			71, 74(9)/DT(2)			
Multiplication-division						
---Whole numbers		43(2)	63(5)	113(8)		
---Fractions			65, 74, 87(10) /DT(2)		143(7)/DT(5)	
---Decimals						
3. Solve problems related to						
Rates		53(9)	74(2)			
Ratio and proportion			86(10)/DT(4) 71(6)			
Averages						
Motion						
Percents						
XI. PROBABILITY AND STATISTICS						
1. Predict the probability of events.						
--Certain events						
--Impossible events						
2. Calculate the average of a set of numbers.			86(10)/DT(3)			
3. Draw and/or interpret graphs.						
Line graphs						
Bar graphs	19(5)		90(10) 93(4)			
Circular graphs					138-9(10)	
4. Read and translate data from tables.	18(8)	53(9)				

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 6

-128-

CHAPTER PAGES	1 1-27	2 28-57	3 58-93	4 94-115	5 116-145	6 146-167
XII. NUMBER THEORY						
1. Recognize special sets of numbers.						
Prime numbers						
Factors of a number						
--Common factor						
--Greatest common factor						
Multiples of a number						
--Multiples of .5, 1 and .1						
--Common multiples						
--Least common multiples						
Ratio						
Proportion						
Exponents						
2. Reduce numerical expressions to lower and lowest terms.						
CHAPTER REVIEWS	26(10)	55(10)	92(10)	114(10)	144(10)	166(10)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6: CHAPTERS 7-12CHAPTER
PAGES7
168-1918
192-2219
222-24310
244-25911
260-28512
286-294

I. STRUCTURE

1. Recognize the laws of mathematical operations.

The order law

(commutativity)

--For addition

--For multiplication

The grouping law

(associativity)

--For addition

--For multiplication

The distributive law

of multiplication over addition

The adding 0 law (additive identity)

The multiplying by 1 law (multiplicative identity)

The multiplying by 0 law

Properties of 1 in multiplication and division of fractions

Reciprocals

Opposites

Zero as a quotient

Order of operations

Complete operation boxes.

Addition boxes

Multiplication boxes

II. SETS

1. Recognize sets from description or roster.

Symbols

--Brace notation

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
-- C -- n -- U Members of a set Subsets Identify special sets. Empty sets Finite and infinite sets Recognize set operations. Union (U) Intersection () Pairing members of sets Relate sets, regions or blocks to numbers. Whole numbers Fractions in common form Fractions in decimal form Relate sets and regions to operations. Addition-subtraction Multiplication-division						
168-191						
168-71(10) /41-5(10) /DT(3)						
III. NUMBER AND NUMERATION 1. Read and write numerals. For whole numbers --To thousands --To millions --To billions --To trillions						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER

PAGES

7
168-1918
192-2219
222-24310
244-25911
260-28512
286-294

For decimal fractions.

--To tenths

--To hundredths

--To thousandths

2. State the place value of a digit.

In a whole number

In a decimal fraction

3. Represent numbers in different forms.

Table form

Standard form

Exponential form

Rounding numbers.

Whole numbers

Decimal fractions

4. Recognize concepts related

to a set of number pairs.

Function rule

Completion of the set

Graphing the set on a number plane

6. Recognize fractional

numbers.

Fractional numbers in

common form

Equivalent fractions in

common form

Mixed numerals in common form

Fractions in percent form.

$$\frac{271(8)/57(10)}{DT(6)}$$

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-132-

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
Fractional numbers in .decimal form						
--Decimal point						
--Terminating and nonterminating	188(10)/DT(2)					
7. Count using nonstandard bases.						
Base 6						
Base 5						
Base 2						
8. Convert a numeral to another form (vice versa).						
Fractions in common form to fractions in decimal form	188(10)/DT(8)				271-2(10) /57(10)/DT(6)	
Fractions in common form to fractions in percent form	187(10)/DT(4)				271(10)/56,58 (10)/DT(6)	
Decimals to percent						
Base 10 numerals to fractions in other bases						
--Base 6						
--Base 2						
--Base 5						
Whole numbers in exponential form to standard form	197(10)/DT(7)					
9. Identify positive and negative integers.					287-8(10)/DT(9)	
10. Use the number line to represent numbers and oper- ations.						
--Fractional numbers						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
--Integers --Multiples Operations --Addition-subtraction --Multiplication-division		205-7(10)/46-7 (10)				289(0)
IV. NUMBER SENTENCES						
1. Identify relational symbols <, >, =, ≠, ...						
2. Translate verbal sentences to number sentences and expressions.		198-9(10)				
3. Recognize open, false and true sentences.		192(0)				
4. Solve number sentences involving Whole numbers Fractional numbers Proportions	168(10)/41-5 (10)/DT(2)				262-4(10) /DT(8)	
5. Two-step equations Inequalities		195-6(10)/DT(3)				
6. Solve mathematical expressions. Use parentheses to show grouping.		193(10)/DT(9)				
7. Identify the order of operation in solving equations.	(See I-1)					
8. Identify related operations in verbal sentences. Addition-subtraction Multiplication-division						

V.	ADDITION AND SUBTRACTION
1.	Recall basic facts.
2.	Add-subtract with whole numbers.
3.	Add-subtract with fractional numbers. Fractional numbers less than 1 --Like denominators --Unlike denominators --Shortcut form Fractional numbers more than 1 --With regrouping
4.	Add-subtract with decimal fractions. Standard form --With regrouping Equation form Shortcut form Add-subtract with integers.
6.	Add-subtract with numerals in different bases. Base 5 Base 6 Base 2
7.	Estimate sums and differences.

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6.CHAPTER
PAGES7
168-1918
192-2219
222-24310
244-25911
260-28512
286-294

VI. MULTIPLICATION AND DIVISION

1. Recall basic facts.
2. Multiply-divide with whole numbers.
 - Multiplication with 2, 3-digit and 1-digit factors
 - Standard form
 - Without regrouping
 - With regrouping
 - Multiplication with 2, 3-digit and 10 or 100 as factors
 - Equation form
 - Standard form
 - Multiplication with 2, 3-digit and multiples of 10 as factors
 - Using the grouping law
 - Using the distributive law
 - Multiplication with 2, 3-digit factors
 - Standard form
 - Division with 3, 4-digit dividends and 1-digit divisors
 - Standard form
 - Without regrouping
 - With regrouping
 - Division with 3, 4-digit dividends and 2-digit divisors
 - Standard form

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-136-

CHAPTER

PAGES

7

168-191

8

192-221

9

222-243

10

244-259

11

260-285

12

286-294

Division with 4, 5-digit
dividends and 3-digit
divisors

--Standard form

3. Multiply-divide with
fractions in common form
Multiplication with
fractions less than 1

--One factor a whole
number

--One factor a percent

--Both factors fractions

168,171(10)
/DT(2)

168,170(10)
/41(7)/DT(7)

Multiplication with

fractions greater than 1

--One factor a whole number

174(10)/42
(6)/DT(1)

175(10)/DT(2)

--Both factors mixed
numerals

Division with fractions
less than 1

--Dividends whole numbers

178,181(10)
/43-4(10)/DT(1)

178,180-2,185
(10)/DT(4)

--Dividends and divisor
fractions

Division with fractions
greater than 1

--Dividends and divisors
whole numbers

186-7(10)/45(8)
/DT(8)

4. Multiply-divide with
decimal fractions.

Multiplication

--One factor 1-digit
whole number

--One factor 10 or 100

222(10)/48(6)
/DT(4)

--One factor a multiple
of 10

--One factor 2-digit
whole number

--One factor 1 or .01

223(10)/49(6)
/DT(1)

273(10)/DT(6)

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
--Shortcut form			223(10)			
--Both factors decimals			227, 229(10) /50(6)/DT(8) 228(10)			
--Shortcut form			234-5(10)/56(6) /DT(1)			
Division			236, 239(10) /52(6)/DT(10) 237(10)			
--Dividends and divisors whole numbers						
--Divisors whole numbers						
--Divisors .1 or .01						
--Dividends and divisors decimals						
--Shortcut form						
5. Multiply-divide with numerals in different bases.						
Base 6						
Base 5						
Base 2						
6. Estimate products and quotients.		212, 217(10) /DT(1)				
VII. GEOMETRY						
1. Identify basic figures.						
Points						
--End point						
--Midpoint						
Lines						
--Perpendicular						
--Parallel						
--Perpendicular bisector						
Segments						
Rays						
		204(10)/46(9)				

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-138-

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
Angles --Sides --Right --Exterior --Angle bisector --Vertex --Congruent						
2. Recognize geometric shapes. Triangles --Equilateral --Isosceles --Scalene Square --Diagonal				255(4)/DT(4) 250, 252(3) /DT(3) 254(10)/DT(3) 250(10) 253(10)/DT(2)	281-2(8)/DT(1) 279-80(4)/59 (4)/DT(1) 279-80(8)/59 (4)/DT(2)	
Rectangle Parallelogram Rhombus Circle --Radius --Diameter --Circumference				250(1) 252(4)		
Trapezoid --Isosceles Polygons --Regular --Perimeter --Angle --Exterior Quadrilaterals				258(6) 254-5(10)		

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
3. Recognize closed surfaces. Cube --Face --Rectangular solid Match geometric figures. Congruent figures --Fittings (complete half-turns) --Face-down --Face-up						
4. --Self-congruence --Corresponding parts Symmetrical figures --Points of symmetry --Lines of symmetry --Planes of symmetry 5. Draw a geometric figure to a given scale. 6. Use a protractor to measure angles.				$\frac{54(6)}{244-6(10)/53}$ $\frac{(6)}{245(4)}$ $247-50(10)$ $/DT(10)$ $251-55(10)$ $/DT(5)$		
VIII. MEASUREMENT 1. Identify and interrelate units of measurement. Length --Metric system --Millimeter --Centimeter --Decimeter			242(10)			

D.C. HEATH INSTRUCTIONAL OUTCOMES

LEVEL 6

-140-

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
--Meter						
--Decameter						
--Hectometer						
--Kilometer						
--English system						
--Inch						
--Foot						
--Yard						
--Mile						
Area						
--Metric system						
--Square centimeter						
--Square decimeter						
--Square meter						
--English system						
--Square inch						
--Square foot						
--Square yard						
Volume						
--Metric system						
--Cubic centimeter						
--Cubic decimeter						
--English system						
--Cubic inch						
--Cubic foot						
Time						
--Years						
--Decade						
--Century						
Angle						
--Degree						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
2. Perform measurements. Linear --Length --Width --Height --Circumference --Meaning of Pi --Formula --Estimates --Perimeter Area --Unit count --Formula Volume --Unit count --Formula Angles --Sum of the angles of a triangle --Sum of the angles of a quadrilateral --Sum of the interior angles of a polygon --Sum of the exterior angles of a polygon			240(6) 240(4)	258(10)	279-80(10) /59(4)/DT(2) 280-3(10) /DT(4) 280(5)/59(4) /DT(2) 281(8)/60(6) 281-2(10)/DT(2)	
IX. FUNCTIONS 1. Recognize function rules involving mathematical operations. Addition-subtraction Multiplication-division 2. Draw graphs on number planes. For number pairs For function rules						

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

-142-

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
X. PROBLEM SOLVING AND APPLICATIONS						
1. Write verbal problems about a set of given data.		214(8)				
2. Solve problems using mathematical operations.						
Addition-subtraction						
--Whole numbers						
--Fractions			226, 230(7)			
--Decimals						
Multiplication-division						
--Whole numbers		200(2)			283(1)	
--Fractions	173, 189(10) /DT(2)	200, 209(7)	226(3)		283(1)	
--Decimals		209(5)	226(5)		283(1)	
3. Solve problems related to Rates					266-7(10) 262-5, 269 (10)	
Ratio and proportion					268, 270(10) /DT(2)	
Averages			230(3)		273(2)	
Motion						
Percents						
XI. PROBABILITY AND STATISTICS						
1. Predict the probability of events.					274-5(10) /DT(3)	
--Certain events					276-8(10)	
--Impossible events					276-8(10)	
2. Calculate the average of a set of numbers.						
3. Draw and/or interpret graphs.						
Line graphs						
Bar graphs		201(7)				
Circular graphs	176(10)					
4. Read and translate data from tables.			231(10)			

D.C. HEATH INSTRUCTIONAL OUTCOMES
LEVEL 6

CHAPTER PAGES	7 168-191	8 192-221	9 222-243	10 244-259	11 260-285	12 286-294
XII. NUMBER THEORY						
1. Recognize special sets of numbers.						
Prime numbers						
Factors of a number						
--Common factor						
--Greatest common factor						
Multiples of a number		203-4, 206-7 (10)				
--Multiples of .5, 1 and .1		205-7 (10) / 46-7 (10)				
--Common multiples						
--Least common multiples						
Ratio						
Proportion						
Exponents		197 (10) / DT (7)			260-1 (10) / 55 (6) / DT (3)	
2. Reduce numerical expressions to lower and lowest terms.					262-5, 269 (10) / DT (8)	
CHAPTER REVIEWS	190 (10)	219 (10)	241 (10)	257 (10)	284 (10)	

DISTRIBUTION LIST

5 - Dr. Richard Schutz
6 - Dr. Robert Baker
1 - Mr. William Hein
1 - Dr. Robert Berger
1 - Dr. Robert O'Hare
1 - Dr. Aaron Buchanan
1 - Dr. Elijah Babikian
1 - James Winchester
5 - P. Dev. CRC
11 - Library
1 - Archives
15 - ABJ
1 - Linda Lester